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SOLUTIONS + SERVICE = SUCCESS

HUNDREDS of fertilizer manufacturers are now producing high-quality, free-flowing fertilizers—containing both nitrate and ammonia nitrogen—through the use of Barrett Standard Nitrogen Solutions.

Barrett technical men have had an important role in the development of this modern method of manufacturing fertilizers which speeds production, lowers costs and improves quality.

For more than 20 years, Barrett's continuing research has constantly worked to improve both the quality of Barrett Standard Nitrogen Solutions and the technology of their use in formulating better fertilizers.

Today Barrett men are qualified by thorough training and long practical experience to render the best possible service on Solutions. This service is available, at all times, to Barrett customers without charge.

Barrett not only sells nitrogen. Barrett also dispenses skill and "*know-how*" in the form of service.

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Barrett Standard Anhydrous Ammonia
Sulphate of Ammonia
Arcadian,* the American Nitrate of Soda
A-N-L* Brand Fertilizer Compound
Barrett Urea Products

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for over 85 years
a symbol of quality
and reliability

Mining phosphate rock at A.A.C. Mines, Pierce, Florida.

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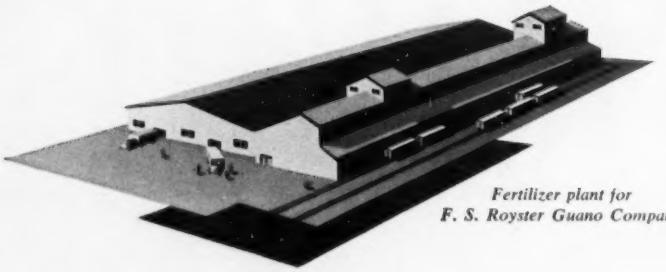
To help make your sales grow, write for samples and prices.

SMITH-ROWLAND COMPANY

NORFOLK, VIRGINIA • CHEMICAL, ILLINOIS



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You will be pleased like many of the largest companies around the world with your McCloskey Buildings. They have found that the complete construction services save them time and money. The modern flexible design also saves on initial investment and future maintenance.

Call on McCloskey before you plan your new building or plant. Learn how you can get the best buildings and at the same time save money. Write McCloskey Company of Pittsburgh, 3412 Liberty Avenue, Pittsburgh 1, Pa.

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Are there costly "leaks" in your Weighing Operations?

The fact that your present scales are simply accurate is not enough today. Ask yourself these questions (1) do they fit your operation (2) are they geared to other production line equipment as to speed and adaptability (3) do they require more labor (man-hours) to use than they should (4) do you have weighing duplication. Searching appraisal of these questions, together with many others, can stop costly "leaks" for you . . . especially in your sacking operations where tonnage counts.

EXACT WEIGHT Sacking Scales, strictly for industrial use, stop these costly leaks because they are designed and built for the chemical industry. Further still they are built for the individual operations of your industry as to speed of operation, production line layout and capacity to save time, money, product and manpower. Write for full details covering sacking and checkweighing scales for your plant.

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SALES and SERVICE in all Principal Cities from Coast to Coast and Canada.

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COMMERCIAL FERTILIZER

ESTABLISHED 1910

May, 1951

Vol. 82. No. 5

ADVERTISING INDEX

Albemarle Paper Manufacturing Co., The 57
Allied Chemical & Dye Corp., The Front Cover
American Agricultural Chemical Co., The Inside Front Cover
American Limestone Co.
American Potash & Chemical Corp. 8
Arkell & Smiths
Armour Fertilizer Works 16
Ashcraft-Wilkinson Co. 16-47
Atlanta Utility Works 65
Bagpak Division 42
Baker & Bro. H. J.
Barrett Division, The Allied Chemical & Dye Corp. Front Cover
Baughman Mfg. Co. 12
Bemis Bro. Bag Co. 7
Bradley & Baker 28
Bradley Pulverizer Co. 66
Chase Bag Co.
Chemical Construction Corp. 13
Coal Chemical Sales Division 17
Cole Manufacturing Co. R. D. 61
Commercial Solvents Corp. 59
Davidson-Kennedy Co. 55
Davison Chemical Corp.
Dickerson Co. The 66
Exact Weight Scale Co. 5
Fulton Bag & Cotton Mills 14
Hammond Bag & Paper Co.
Highway Equipment Co., Inc.
Hough Co. The Frank G.
International Minerals & Chemical Corp. 18
International Paper Co., (Bagpak Division) 42
Jute Co. The 63
Jeffrey Mfg. Company 65
Kraft Bag Corporation
Law and Co. 66
Lion Oil Company 43
McArthur, H. I. 66
McCloskey Co. of Pittsburgh
McIver and Son, Alex. M. 55
Marietta Concrete Corporation, The
Monte and Co., Inc. 28
Monsanto Chemical Co. 4
National Lime & Stone Co., Inc. 64
Phillips Chemical Co. 15
Planters Fert. & Phosphate Co. 60
Plastoel Products Co. 9
Potash Co. of America Inside Back Cover
Quaker Oats Co., The 55
Ransome Industrial Mixer Division
Raymond Bag Co. 11
Sackett & Sons Co., The A. J. 34-35
Smith-Rowland Co., Inc. 3
Southern Fert. & Chemical Co. 62
Southern States Phos. & Fert. Co. 65
Spencer Chemical Co.
Stedman Foundry & Machine Company, Inc. 25
Sturtevant Mill Co.
Tennessee Corporation
Texas Gulf Sulphur Company
Nitrolay Titlestad Corporation 28
Tull Metal & Supply Co., Inc. J. M. 25
Union Special Machine Co. Back Cover
United States Potash Co. 39
United States Steel Corporation—Subsidiaries, Coal Chemical Sales Div. 17
Virginia-Carolina Chemical Corp. 38
Werner, Edward A.
Wiley and Company 66
Willingham-Little Stone Co. 58
Woodward & Dickerson, Inc. 59
Worthington Pump & Machinery Corp. Ransome Industrial Mixer Division

Published Monthly by

WALTER W. BROWN PUBLISHING CO., INC.

75 Third St. N. W., Atlanta, Georgia Phone Atwood 4100

ERNEST H. ABERNETHY, *President*

BRUCE MORAN, *Editor* V. T. CRENSHAW, *Business Manager*

Subscription rates: United States, Mexico and Cuba $2.00 per year. Canada, $3.50 Foreign $4.00 per year.

In This Issue

Just Around the Corner, by VERNON MOUNT 10
Sulfuric Acid Allocation 19
It Seems to Me, by BRUCE MORAN 19
USDA's Annual Report to the Industry, by R. Q. PARKS 20
Mechanization Pays Off 31
ASSOCIATIONS
NAC Convention, story and pictures by VIRGINIA CRENSHAW 36
NFA Convention Outline 40
APFC Convention Plans 40
Canadian Convention Date Set 41
Around the Map 44
Mostly Personal 48
American Metal Potash Report 51
ALLIED FARM CHEMICALS
Determination of Residues, by W. K. LOWEN 52
Spray Machinery Calibration Needed 61
Radioactive Research Report, by VINCENT SAUCHELLI 54
Battelle Report on Copper Tests 62
Markets 65
Classified Advertising 66

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COMMERCIAL FERTILIZER, entered as second class matter, October 12, 1910, at the post office at Atlanta, under the Act of March 3, 1879. Published monthly except semi-monthly in September, by Walter W. Brown Publishing Co., Inc., 75 Third St., N. W., Atlanta, Georgia.

Fertilizer is Wearing a New Dress...

Do customers want to buy fertilizer in good quality, high-count cotton sheeting bags that have home sewing and other secondary uses?

You're mighty right, they do. They're glad to pay the small difference.

Bemis tried it out with fertilizer companies in Southern markets and customers switched in droves to fertilizer packed in the new Bemis H-C (high-count) Sheeting Bags. Now the biggest manufacturers are packing in them. And they're going country-wide.

Besides the valuable secondary uses, Bemis H-C Bags have these advantages:

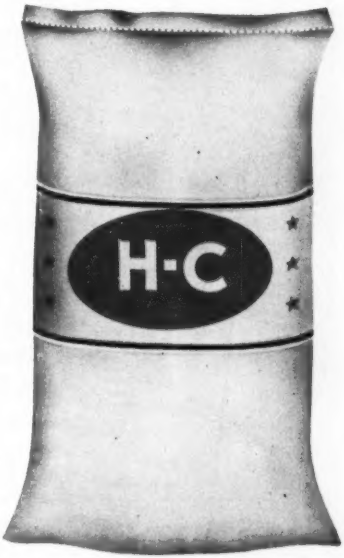
- ★ They are attractive, attention-getting merchandisable packages.
- ★ Bemis Band-Label (white paper) shows your brand in crisp, bright colors . . . and your analysis and ingredients can be printed or stencilled on locally.
- ★ Sifting is minimized.
- ★ Dealers have few or no returned bags . . . customers want to keep 'em because they're getting goods at about one-third the store cost.
- ★ Customers like the easy way the fertilizer washes out.

ASK YOUR BEMIS MAN FOR THE COMPLETE STORY AND A SAMPLE BAG . . . OR SEND THE COUPON.

Bemis

BEMIS BRO BAG COMPANY

Bemis H-C (HIGH-COUNT) Sheeting Bags!



BEMIS BRO. BAG CO.
408-N Pine St., St. Louis 2, Mo.

Send complete information about Bemis H-C (high-count) Sheeting Bags for Fertilizer and also a sample bag.

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Address_____

City_____ State_____

POTASH
TRONA
SALTS
Trona
Muriate of Potash
This vitally important ingredient of mixed fertilizer provides the soil nutrient necessary to resist plant diseases and to enhance the productivity of crops. To obtain the best results, specify "Trona" Muriate of Potash . . . made by the pioneer producers in America.
THREE ELEPHANT BRAND
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Three Elephant
Agricultural Pentahydrate
Borax
Contains a minimum of 44% B_2O_3 or approximately 121% equivalent Borax. More economical in this concentrated form when used as an addition to fertilizer or for direct application to the soil, to correct a deficiency of Boron. Consult your local County Agent or State Experimental Station.
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MICA makes the DIFFERENCE

Mica makes a BIG difference! And experienced engineers, contractors and maintenance men know that PLASTEEL — *and only Plasteel* — gives them this BIG difference — MICA'S permanent protection! Mica resists the toughest climatic and atmospheric conditions. Mica needs no paint, no repairs. Mica reflects solar rays, Mica is attractive. Mica prolongs the life of your buildings. Write for details.

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JUST AROUND THE CORNER

By Vernon Mount

THE MACARTHUR AFFAIR IS VERY AMERICAN. It could not happen anywhere else that a high ranking officer, almost an Emperor (and in Japan, almost a God), should be fired peremptorily, and then get the adulation of millions, under tons of ticker tape. In Russia he would have been liquidated many months ago.

THE FUNDAMENTALS ARE SIMPLE. The basic difference between MacArthur's thinking and that of the Government is a matter of idealism versus realism. And the switch is amazing. Here is a hard-bitten army officer being an idealist, while the Fair Dealing Truman is on the side of realism.

LOGISTICS IS THE BASE PROBLEM. The Government recognizes that a war is fought on materiel, laid down where the war is, and laid down when it is needed, which in this case would be quickly. Europe produces war materiel. Asia does not. The Government position, stripped of the tinsel of political presentation, boils down to that.

OUTGUESSING STALIN is another matter. He might choose to attack in the Orient. He may want the Asian countries first, Europe second. Or vice versa. That is the problem facing the UN...which really means US.

A THOUSAND YEARS FROM NOW they will know who was right this year, because the wisdom of today's decisions will affect the whole future of civilization as we know it. I hope our politicians can at least try to be statesmen until the decision is made dispassionately.

Yours faithfully,

Vernon Mount

COMMERCIAL FERTILIZERS — the solid foundation of the prosperous farmer

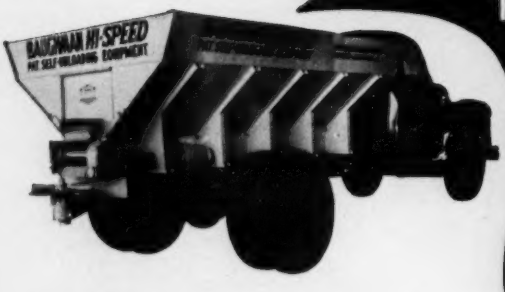
Custom Built RAYMOND MULTI-WALL PAPER SHIPPING SACKS—the favorite packing and shipping sack of the fertilizer industry

Each year, as more and more growers turn to commercial fertilizers for production help, Raymond fertilizer Shipping Sacks grow in demand. Today, in all parts of the country, wherever fertilizer is used you'll find these quality Shipping Sacks on the job.

Made in various types, sizes, and strengths, printed or plain, Raymond Shipping Sacks meet every requirement of the producer, packer, and shipper of fertilizer.

THE RAYMOND BAG COMPANY
Middletown, Ohio

RAYMOND *MULTI-WALL* PAPER SHIPPING SACKS

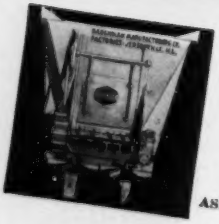


For the complete line of spreader bodies, look to Baughman, because

Baughman BUILDS 'EM ALL !

ASK-3-S

ASK-3W-4



ASK-MS-4

- 13 basic agricultural models . . . one or more is engineered and built to fit your specific needs.
- Lengths from 9 to 33 ft. (5 to 30 tons capacity) . . . 1 to 6 compartments for selective unloading.
- Available with single or double distributor.
- Available in 4 different gear reductions and flight spacing as desired to control volume from a few hundred lbs. per acre to 3 or more tons per acre.
- Complete selection of bottom widths, top widths and degrees of side slope.
- Built of high tensile alloy steel to assure maximum payload.
- Baughman's NEW Oil Sealed Clutch and 3 Speed Transmission regulate rate of discharge from body. Velocity of spinner remains in constant ratio to engine speed due to new direct type drive — permits wide, even spread at all times.

Write for full information and our recommendations. More than 25,000 Baughman Self-Unloading Bodies from coast to coast.

Model O-2 Spreader Attachment — Gives uniform spread on the level, slopes or hillsides. Folds securely for highway travel. Ideal for rock phosphate, dry powdered lime and many other materials.

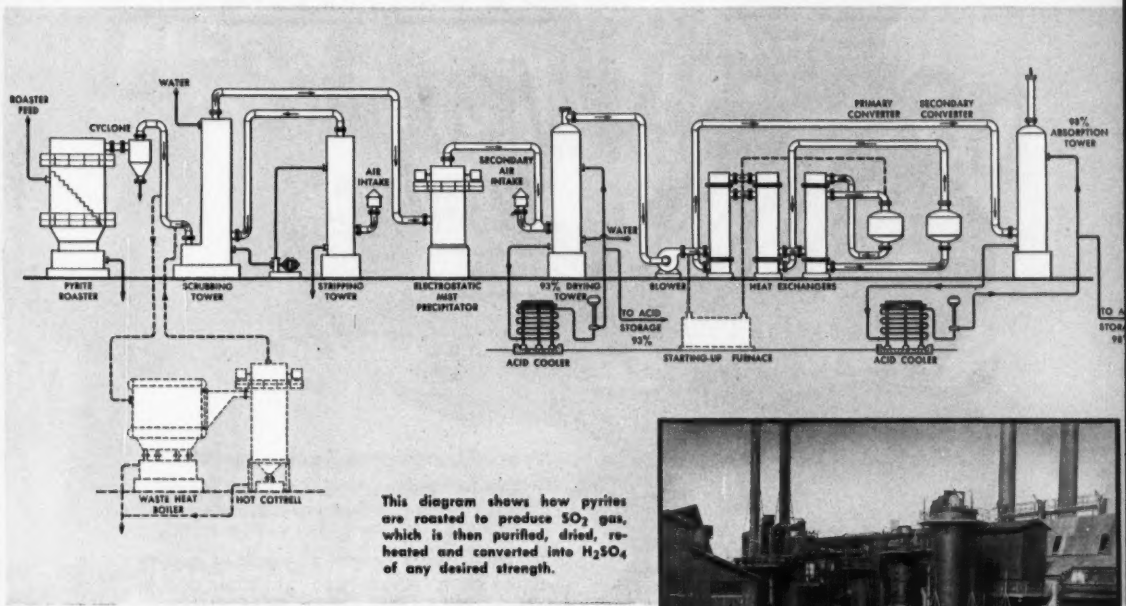
Model 235 Fertilizer Sprayer. Holds the material to the ground and makes it stick. Covers as high as 4 acres to the mile at 15 miles per hour. High tensile alloy steel construction. Rubber and canvas curtains prevent blowing.

BAUGHMAN MANUFACTURING CO., Inc.
951 SHIPMAN ROAD JERSEYVILLE, ILLINOIS

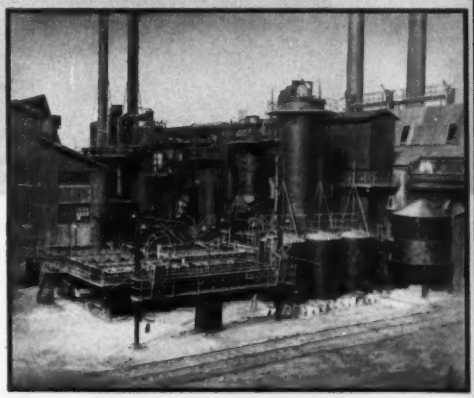
"The Pioneers of the Fertilizer Spreading Industry"

Another practical solution to the sulfur shortage

Make Sulfuric Acid from PYRITES



This diagram shows how pyrites are roasted to produce SO_2 gas, which is then purified, dried, re-heated and converted into H_2SO_4 of any desired strength.



For additional information on this Chemico process write for Bulletin S-102

HERE's a practical answer to the sulfur shortage. With the Chemico acid process diagramed above, vitally needed sulfuric acid can be manufactured from ores such as pyrite, pyrrhotite and other metal sulfides which are in plentiful supply. The Chemico acid process can be adapted to use the sulfur dioxide gas from any preferred standard type of roaster.

Our wide experience in the design and construction of acid-making facilities enables us to deliver efficient plants on a performance-guaranteed basis.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

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Chemico plants are profitable investments

CC-215

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build lasting **GOOD WILL** *for your product*

It's good business *and* good public relations to give customers something extra for their dollar. You do just that when you use Fulton Cotton Bags, for in every ton of fertilizer (20 bags) there is over 23 yards of quality cotton cloth, which is sought after and in demand for home sewing. Customers not only prefer fertilizer in cotton bags, but also appreciate the extra dividend of valuable sewing material.

Fulton Cotton Bags are easier to handle, too — less subject to tears and snags which incur waste and subsequent profit losses. Step up your own sales with Fulton Quality Cotton Bags — and reap the benefits of consumer preference.

Your nearest Fulton Branch will be happy to work with you in winning new friends and building lasting good will for *your* product.

Fulton BAG & COTTON MILLS

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Phillips has the Nitrogen You Need!

AMMONIUM SULFATE

Phillips *66* Ammonium Sulfate is a free-flowing 21% nitrogen material! Mixes easily! Uniform crystals resist caking! Ideal for high analysis mixed goods! A fine direct application material, too!

AMMONIUM NITRATE

Phillips *66* Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Depend on Phillips *66* Prilled Ammonium Nitrate for uniform, free-flowing properties and top-notch crop response.

NITROGEN SOLUTIONS

Get more N per dollar! Phillips *66* Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low! Promote rapid, thorough curing!

ANHYDROUS AMMONIA

Tank car shipments of Anhydrous Ammonia (82% nitrogen) are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle. Write our nearest district office for full information.

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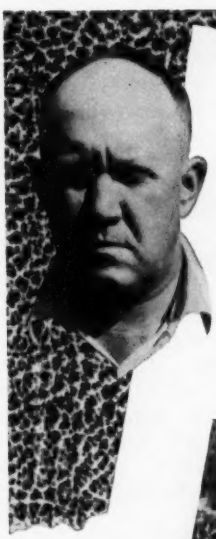


Pastures treated with 8-8-8 carried 30% more cattle for Beryl Wayt, Michigantown, Ind.

"I applied 8-8-8 at the rate of 400 pounds per acre on 25 acres of Big English bluegrass and ladino clover," says Mr. Wayt. "I also applied 400 pounds of 0-12-12 on 10 acres of the same mixture. The pasture treated with 8-8-8 carried 30 per cent more cattle per acre than the pasture treated with 0-12-12."

400 pounds of 0-12-12 fertilizer per acre.

400 pounds of 8-8-8 complete fertilizer per acre.

USS AMMONIUM SULPHATE UNITED STATES STEEL

Bigger yields for farmers ...better business for you

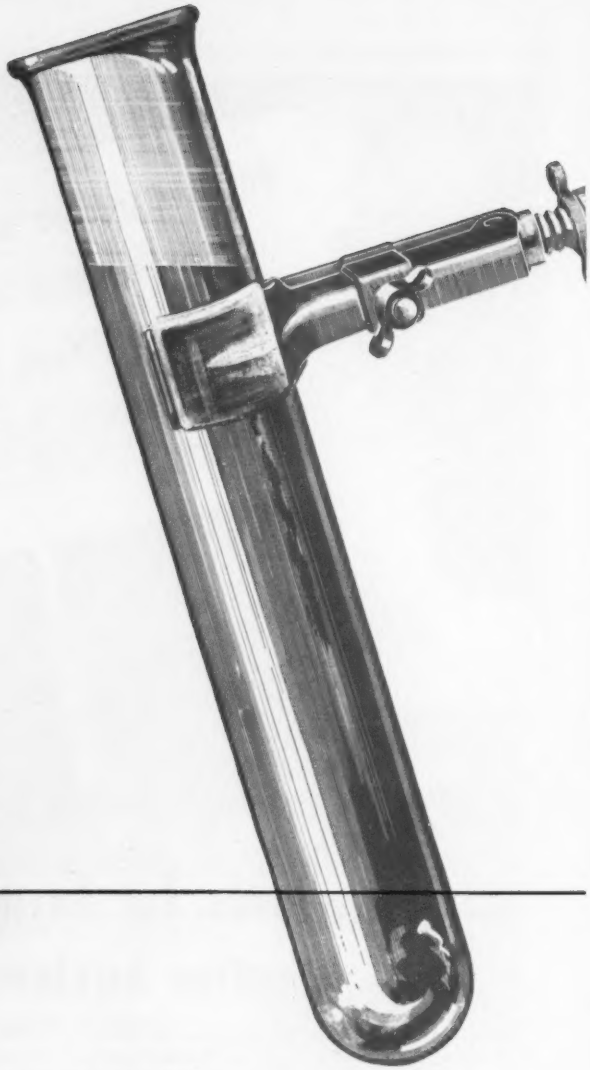
● Experiences like that of Mr. Wayt are convincing farmers that high-analysis mixed fertilizers point the way to bigger yields and bigger profits every time.

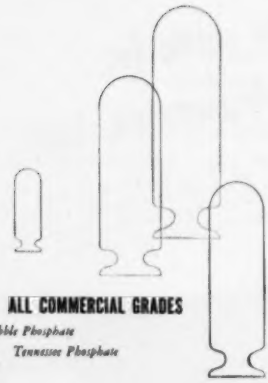
You can obtain your full share of this business by including in your line high-grade complete fertilizers in which U·S·S Ammonium Sulphate provides a major part of the nitrogen. Fertilizers containing U·S·S Ammonium Sulphate stand up well in storage . . . perform well in drills and other distributing equipment . . . pay off in increased yields.

You'll probably find supplies of Ammonium Sulphate somewhat shorter this year so plan your needs well in advance. United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

USS **U·S·S AMMONIUM SULPHATE**

UNITED STATES STEEL





ALL COMMERCIAL GRADES

Florida Pebble Phosphate
Tennessee Phosphate

International phosphates

UNIFORMITY

International Minerals & Chemicals

PHOSPHATE DIVISION
INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6

Mines and Plants in Florida at Noralyn, Peace Valley, Achan, Mulberry; in Tennessee at Mt. Pleasant and Wales.

Sulfuric Acid Placed Under Limited Allocation

National Production Authority, U. S. Department of Commerce, placed sulfuric acid (all grades, strengths and qualities, both virgin and fortified, including oleum and recovered or spent sulfuric acid) under limited allocation, effective June 1, 1951.

Specific authorization by NPA to use or deliver sulfuric acid is required by the new order (Schedule 3 to Order M-45) only in these States: Washington, Oregon, California, Arizona, New Mexico, Nevada, Utah, Colorado, Wyoming, Idaho and Montana.

Buyers and users of sulfuric acid in all States must certify to suppliers the end-uses to which the chemical would be put. Suppliers in all but the 11 western States must nevertheless file applications with NPA on Form NPAF-47 and may not deliver sulfuric acid to a purchaser who has not filed a certified statement of proposed use as required by NPA Order M-45. Such suppliers may, however, deliver and use sulfuric acid without express authorization unless otherwise directed by NPA.

These are the vital facts to remember:

1. Purchasers of 60 tons a month or less are exempted from the order.

2. Initial allocation date—June 1, 1951.

3. Specific NPA authorization to deliver or use acid required in 11 western States listed above.

4. Filing date for June 1, 1951 allocation is May 5; all other filing dates are the 10th of the month preceding month of use.

5. All acid suppliers must request authorization to deliver or to use any quantity of acid in excess of 60 tons on Form NPAF-47.

6. Authorization to acid users terminates at end of month for which use was authorized.

7. Forms may be obtained from National Production Authority, Washington.

Orders carrying MRO priority DO-97 dated before April 16, 1951 for many commodities including all basic chemicals, their intermediates or derivatives are cancelled. Also cancelled are MRO orders for paper and paper products, packaging materials and containers; items appearing in list "A" of NPA Order M-47; rubber tires and tubes. This list is only partial. Contact NPA for complete list. Chemicals customarily sold as fertilizers are not affected by this order. Abuse of the DO-79 priority by some firms has caused NPA to tighten up its priority procedure. You can no longer apply the DO-97 priority to the above items for Maintenance, Repair and Operating supplies. These items must now be purchased on the open market. If a serious situation develops, contact NPA for aid.

It Seems to Me

by BRUCE MORAN

The month of May traditionally brings us to the annual report by USDA to the Fertilizer Industry. This is written exclusively for Commercial Fertilizer by one of the busy USDA staff each year.

We present it because we feel USDA is entitled to full recognition, and because we believe the Industry should know more fully what that great organization is doing to help us and our customer, the farmer.

So it has become an annual custom to throw open a large portion of our May issue to the U. S. Department of Agriculture. It seems to me you will want to read every word of the twelve page article in this issue, beginning on page 20.

USDA'S ANNUAL REPORT, VIA COMMERCIAL FERTILIZER TO THE ENTIRE INDUSTRY

Fertilizer Use and Soil

Introduction

The agriculture of this country has been modified time after time by research findings on the use of soils and fertilizers.

The first recorded use of fertilizers in this country was the Indian practice of burying a fish under each hill of corn (to furnish nitrogen and phosphorus to the plants). This practice was adopted immediately by the settlers on the acid, leached, low-producing New England soils. Then wood ashes were used as a source of potash, bones for phosphorus, and marl to neutralize soil acidity. Since that time, there have been many changes in fertilizer materials, and the use of fertilizers in this country has increased steadily over the years. Research in fertilizer technology and manufacturing methods has developed new fertilizer materials and better mixed fertilizers to meet the needs of various crops on different soils. These studies, together with soil management research, are in no small way responsible for the doubling of fertilizer use by American farmers during the last 10 years, to an all-time high of more than 18 million tons in 1949.

As the pioneers pushed to the West, major differences in soils were observed. Some soils were dark and rich, and produced luxuriant crops year after year —other soils were shallow, droughty, and less productive from the start. Crop adaptation and fertilizer needs varied with climate and with soil characteristics. Soil survey procedures have been developed during the past 50 years to make possible the scientific classification and mapping of soils. Reports and maps of these surveys show the nature of the soils, their distribution, and their agricultural potentialities. The survey of soils in the United States is far from complete, but the value of soil surveys increases steadily as better survey methods are developed and more soil management research is completed.

Research in the management of soils and the use of fertilizers has progressed with improvements in fertilizer technology, crop breeding, soil survey, and farm mechanization. Soil management studies involving fertilizer use often give practical results in only a few years time. But many of these studies must be long-time experiments to determine the effects of crop rotations and fertilizer use on the gradual upward or downward trends in productivity of different soils. The full benefit from experiments of this kind started now will not be realized for another 20 years or more.

Soil Management and Irrigation

Research in soil management is designed to develop and evaluate systems of crop, soil, and water management for the various soil and climatic areas of the country. The factors involved are many, including use of fertilizers, lime, manure, and crop residues; the effects of temperature, rainfall, and other climatic factors; as well as cultural practices, irrigation methods, and cropping systems or rotations. These studies must determine not only the immediate effect on crop yields, but also the long-time influence on soil structure, fertility levels, erosion control, and over-all soil productivity trends.

Our research methods have not as yet been developed to the point where we can study the effectiveness of different combinations of all of these factors at one time. A large number of

By R. Q. PARKS[1]

Fertility Research

R. Q. Parks, the author

[1]Assistant Head, Division of Soil Management and Irrigation; Bureau of Plant Industry, Soils, and Agricultural Engineering; Agricultural Research Administration; United States Department of Agriculture, Beltsville, Maryland.

separate investigations are carried out, and the results gradually merged to give broader and more complete answers to the complex soil management practices involved. The investigations take the form of studies of the chemistry of a group of soils and their reactions with fertilizers and studies on the nutrient, water, and management requirements of crop plants. As these experiments are expanded under field conditions, the residual effect of the crop and its various treatments must be measured in terms of their effect on soil structure, soil fertility, and soil organic matter levels. Then, as soon as it is possible to select out a few of the most promising combinations of fertilizer and management practices for several crops, these crops are fitted together into simple crop combinations, and then into more complex crop rotations, to work out the best systems of soil and crop management. Mention is made in this report of soil management research at all stages in this process, from the separate segments to the complex studies of many soil and crop factors, representing the combination of a large number of smaller, separate—but essential—lines of research.

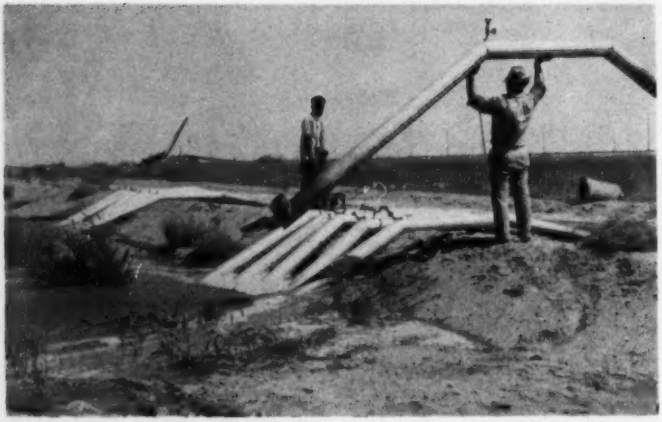
Alfalfa in the Southeast

The agriculture of the southeast has been traditionally a one-crop system, but far-reaching changes are taking place. Research has just shown how to economically produce 80 bushels of corn on land that formerly grew 20 bushels to the acre. Techniques are being developed for winter grazing of cattle on oats and clover and for producing a variety of nutritious summer hay and pasture forage crops. In short, research is finding the combinations of practices to give the South a diversified agriculture, with emphasis on livestock.

One of the weakest links in the program to date is the lack of a high quality, productive hay crop. Alfalfa fills this place in other regions, but the steps to its production in the South are just being worked out.

Research has shown that boron is an essential fertilizer material for alfalfa in the Southeast, that lime levels are critical, that phosphorus needs are high, and that potash fertilizers must be supplied at several times the rates necessary in other regions. Soil management investigations in cooperation with the South Carolina Agricultural Experiment Station are being concentrated on the fertilizer and management requirements of this single crop.

Initially, lack of available phosphorus was the major factor limiting growth of alfalfa on the Piedmont soils studied. Yields increased with increasing rates of phosphorus fertilization when adequate quantities of boron, potash, and lime were supplied. The better treatments produced more than 2½ tons of hay the first year and more than 4½ tons per acre the second year. During hot, dry weather, there was little wilting of the crop where lime and fertilizer had been banded eight inches deep in the soil. The alfalfa suffered for lack of water where the fertilizer had been placed in the surface layers of the soil.



Siphons used in irrigation of experimental fields on Yuma Mesa, Arizona.

Deep placement of lime and fertilizer and the use of deep-rooted legumes are also being used in experiments at other locations to find ways of increasing the rooting depth of all crop plants and to make better use of both water and fertility reserves in the deeper layers of soil. Another effect of the deep placement of phosphorus was to decrease the effect of subsequent surface applications of phosphorus fertilizer.

Techniques for maintenance of fertility are also being developed to supplement the residual treatment effects. Even three years after application, 1,000 pounds of superphosphate gave a 25-percent increase in yield. Similarly, the residual benefit of two tons of lime was responsible for a 30-percent and a 55-percent increase in yields over the 1-ton rate, in the second and third year of the experiment. This study has been exceptionally productive to date, yet it will be years before these treatments and treatment combinations will be able to tell us all that we need to know about their effects on both crop and soil.

Soils Release Potash

Keeping a field of alfalfa producing vigorously may require from 100 to 500 pounds of K_2O per acre per year in the Southeast—yet the same crop requires less potash fertilization in the North Central States—and no potash at all in the West. Why? The potash requirement of the alfalfa plant is high wherever it is grown. Detailed research has shown that on some soils, the native soil mineral potash contributes substantially to the potassium requirements of plants. Other soils apparently can supply but little potassium in this form to crops, even though the total potash content of the soil may be high.

Specialized, basic research facilities are being concentrated on this problem to determine which soils and soil minerals are most important in supplying potash to plants and to learn more of the mechanisms by which potash release takes place. Soils have been collected from Maine, Pennsylvania, Ohio, Illinois, Alabama, Nebraska, North Dakota, and Montana. These soils have been subjected to mineralogical analysis, electrodialysis, and other laboratory procedures, and to continuous greenhouse cropping to determine maximum potential rates of potash release. In more than three years of cropping with no additions of fertilizer potash, release from native soil minerals was found to vary from 200 to more than 1,400 pounds of potash per acre, with even greater rates of release by the western soils.

These studies have shown that potash is released by both silt and clay fractions of soils, and that at least part of the potash continues to be released regardless of potash fertilizer practices—which means that fertilization and cropping practices must be adjusted to make most efficient use of this native soil potash as it becomes available. This and other results produced by this intensive and detailed research in soil chemistry and mineralogy are already being used in planning more general field experiments, at several locations, of more efficient use of soil and fertilizer potash.

Certain Soil Minerals Fix Ammonium Ion

Closely related to the release and fixation of potash in soils is the question of recovery and efficient use of the nitrogen fertilizer added to the soil in the form of ammonium salts. The ammonium ion can be fixed in the crystal lattice of clays in a manner similar to the fixation

of potassium ions. Detailed laboratory studies were carried out to determine the extent to which incomplete recovery of added ammonium fertilizer was due to this process. In particular, the studies were to determine to what extent failure to obtain 100 percent nitrification is due to the fact that the fixed ammonium is not available to nitrifying bacteria.

It has been shown repeatedly that full conversion into nitrates does not take place no matter how long the nitrification is allowed to proceed. Some of the added ammonia is known to be fixed by the soil colloids so tenaciously that it is not removed by normal potassium chloride, calcium chloride, or other salts commonly used for the extraction of exchangeable ammonium.

The experiments demonstrated that most surface soils from the humid region that have been tested do not show a marked tendency to hold ammonia in a nonexchangeable form. Not enough data have been obtained, however, to justify general conclusions. Sandy soils containing little colloid, and also clay soils that are predominantly kaolinitic in nature, fixed little ammonium. On the other hand, a calcareous Webster soil from Iowa that contains minerals of the montmorillonitic and hydrous mica types fixed considerable ammonium. The quantity fixed by this soil when kept wet was only about half as much as when it was air-dried. Heating to 100° C. for several hours further increased the fixation by nearly 100 percent over the air-dry treatment. The type of clay mineral present in the soil colloid is evidently the determining factor in ammonium fixation and probably also in its release.

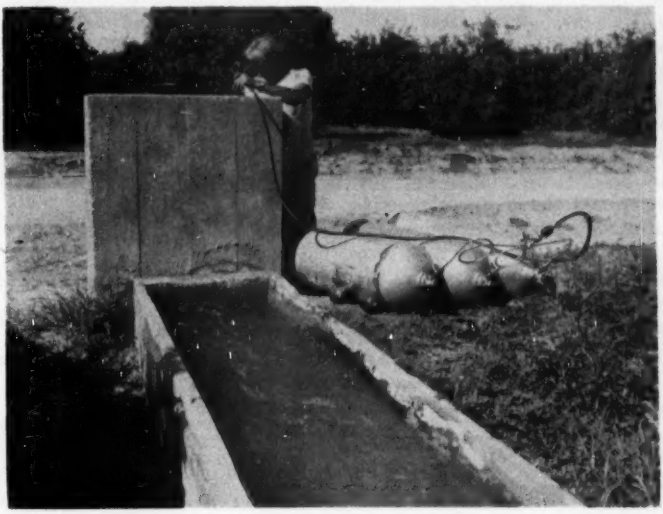
Availability studies showed that only 10 to 30 percent of the fixed ammonium in the Webster soil was converted into nitrates in a period of six weeks. Presumably the remainder of the fixed ammonium ion is slowly released later to growing crops, but this remains to be determined. Additional chemical and biological studies are in progress to determine the ammonium-fixing powers of other soil types, the conditions that favor the fixation, the types of soil minerals involved in the fixation process, and the availability of the ammonium to nitrifying bacteria. Obviously, the results of this study can be channeled into broader experiments on efficiency of nitrogen use and the maintenance of nitrogen balance under various soil and cropping conditions.

The Root Zone Reservoir

When the roots of a crop spread throughout the top 12 inches of soil in a field, that crop can draw on the water and nutrients in just that 12 inches of soil. If the crop has a root zone 24 inches deep, its reserves of nutrients and water are usually increased greatly. This is but one reason for attempting to increase the depth of rooting of crops on nearly all soils. Several segments of research are in progress on this problem. The results are promising, and should begin to merge into practical applications on a large scale within the next few years.

Highly technical and elaborate equipment was used in the greenhouses at Beltsville to determine the oxygen requirements of plant roots at different stages of growth. The oxygen content of atmospheric and soil

Ammonia gas being run into irrigation water (Nitrogation) at Yuma Mesa, Arizona



Irrigation development in the Pasco Area, Columbia Basin, Washington.

air approximates 20 percent, yet small reductions in oxygen percentage of soil air have little effect on plant growth. Root growth and activity of tobacco and tomato plants was significantly reduced by oxygen values below five percent in the soil air; while the effect on soybean roots was not apparent until oxygen values fell to 1.5 percent or lower.

Another line of attack on this same problem is being conducted under field conditions in Alabama through tillage experiments to determine effects of the various implements on soil structure and on air and water movement in the deeper soil layers. Some treatments have produced soil compaction that restricted the depth of rooting of cotton. Yet soil oxygen measurements at several depths in the profile have not shown sizable reductions in oxygen content of the soil air. Soil structural changes and their effects on the soil air and water relationships constitute one of the most pressing challenges in soil management research today. If soil aeration should prove to be less of a problem than has been thought, then even greater emphasis must be placed on soil moisture supply, since it is the other major plant growth factor dependent on soil structure.

Still another line of attack is being made on this problem in cooperation with the Mississippi Agricultural Experiment Station. Kudzu is a deep-rooted legume, generally thought to leave an unusually long-lasting residual benefit in soils. A large-scale field experiment has been started to determine the magnitude and duration of the residual benefit of kudzu and to determine whether this benefit is due to nitrogen supplies in the roots, to better soil permeability, larger soil moisture supplies, deeper penetration of the roots of following crops, or other factors.

This Mississippi experiment was designed in 1946, and one block of land was planted to kudzu each year in 1946, 1947, 1948, and 1949. Some plots in each kudzu block are maintained in continuous corn, and as each kudzu block is plowed up it will be planted to corn with varying fertilizer treatments. One kudzu block will be plowed up each year from 1950 through 1954, and crop yields and composition, soil moisture and structure changes, and other data determined for at least 10 years. The most productive results of this experiment should be realized during the 10-year period beginning in 1955, and present plans are to terminate the experiment by 1970. In the meantime, work is under way at several experiment stations in the South to develop the best methods for fitting kudzu and other legumes into cropping systems with both grain and row crops.

A detailed field and laboratory study of the effect of different cover crops on soil productivity is under way in another cooperative project at Clemson, S. C. The crops being studied are alfalfa, small grains, Ladino clover and fesue grass mixture, Kobe lespedeza, and sericea lespedeza. Plots of each green-manure crop will be planted to an indicator crop after periods of 1, 2, 3, 4, and 5 years. Detailed root studies, as well as soil chemical and physical studies, are planned to determine the effects of these crops on soil organic matter and nitrogen levels, soil physical properties, and related factors. The treatments in this experiment will all be completed by 1955, while the most important residual studies can probably be completed by 1960 to 1965. Here, again, many of the results of this experiment will be of use in other studies, and in recommendations to farmers during the progress of the experiment.

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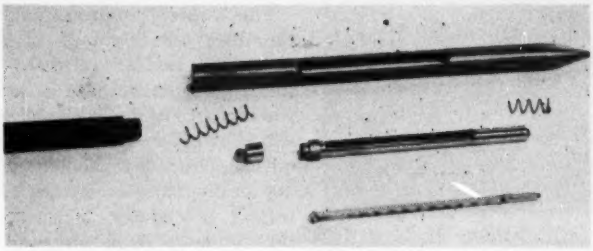

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R. L. Carter, Georgia AES soil scientist uses a gieger counter to check radioactive phosphorus uptake in spanish peanut plants.

Soil Fertility Trends

Many States are making tests for plant nutrients on large numbers of soil samples submitted by farmers. The primary purpose of this service is to give the individual farmer dependable information on the fertility level of each field on his farm. A cooperative study has just been completed by workers in this Bureau and the North Caroilna, Tennessee, and Mississippi Agricultural Experiment Stations, summarizing soil-test information available in these States in recent years. The results of this study indicate the need for further development of this and other techniques for estimating the nutrient status of soils over broad agricultural areas.

A general picture of the nutrient status of soils of an area aids research workers in orienting their studies. If such data are obtained at appropriate intervals, they reflect trends in soil fertility. We know which areas are being improved and which are on the decline. Trends in nutrient status reflect the effectiveness of research, educational, and action programs. The data also serve as a board basis for estimating fertilizer and lime needs for given areas.

The general appreciation of the need for this type of approach is further reflected in the establishment of a soil-test work group by the National Soil and Fertilizer Research Committee. This work group is taking an inventory of current soil-testing procedures in each of the States and is planning a comprehensive report and recommendations on the basis of its study. It is further felt that this work group will be able to develop interest in better soil test calibration through field experiments and through a regional approach to the problems and reports of soil test data and soil fertility trends.

J. W. Borland, checking the radioactive phosphate separated from a plant material, using a lead-shielded gieger tube, and the electric counter on the right.

A more direct study of soil fertility status and trends is now under way in Duplin County, N. C. Investigators from this Bureau and the North Carolina Agricultural Experiment Station are determining the nutrient status on a statistical sample of soils, based on the recently completed soil survey map of this county. In addition to furnishing the base estimation of fertility trends at 10-year intervals, this study will also give an indication of the bias involved in studies based on soil samples submitted by farmers.

Soil samples have also been collected in cooperation with State workers in Delaware, Maine, New Jersey, and Rhode Island. The purpose of this study is to determine soil fertility levels existing on pasture lands in the Northeastern States, and to develop fertilization and management practices to improve forage production in this area.

Tests on grassland soils from Kent and Washington Counties, R. I., showed that 75 percent of the good and excellent sods were on soils with pH values above 6.0, but only 7 percent of the poor sods were in this class. The soil samples were taken from grasslands rated excellent, good, medium, fair, poor, and very poor. Analysis was made for pH, calcium, phosphorus, potassium, magnesium, and organic matter.

In the calcium analyses, 92 percent of the good and excellent sods had more than 1,600 pounds of calcium per 2,000,000

pounds of soil, as compared with seven percent for the poor pastures. Eighty-four percent of the better sods tested more than four pounds of phosphorus, as compared with 47 percent for the poor pastures. Ninety-two percent of the soils from good and excellent sods tested over 120 pounds of magnesium, whereas only 13 percent of those from poor sods tested this high. Potassium, on the other hand, averaged no higher on good sods than on poor ones.

Experiments to determine response to fertilization have been started on fields selected to represent the range of fertility levels found in this study. Even though there are differences in the phosphorus and potassium status of soils from this pasture survey, the fertility status of pasture soils contrasts greatly with much higher nutrient levels found in a survey of soils used in intensive potato production in the Eastern States.

Fertility Decline in the Great Plains

The agriculture of the Great Plains is a depleting agriculture, and the process of exporting plant nutrients in the form of grain and other cash crops has been going on for 50 years. Until recent years there has been little concern over the nitrogen, phosphorus, and organic matter losses that have been taking place in dry-land soils. Moisture has been so much of a limiting factor in crop production that losses of potential productive capacity through nitrogen depletion have been obscured. Furthermore, exploratory tests with fertilizers some years ago showed no responses.

In recent years, there have been many indications that nitrogen losses are becoming a serious matter. Among these are more frequent signs of nitrogen deficiency during cool, wet springs; greater response to manure in years of favorable rainfal.; less damage from the stimulating effect of manure in adverse seasons; and the great increase in the early growth of introduced grasses brought about by applications of nitrogen.

The results of preliminary studies showed nitrogen and organic matter losses so much greater than was anticipated that it was deemed advisable to make an exploratory study of the whole Great Plains region, to try to determine the changes that have taken place in different soils under a wide range of climatic conditions.

During the season of 1947, approximately 1,500 soil samples were taken at 14 locations in the Great Plains and sent to the Bureau laboratory at Mandan, N. Dak., for analysis. These analyses will be completed during 1950, but the results to date show that: (1) Losses of soil organic matter during 50 years of cropping range from 25 to 60 percent; (2) losses of soil organic matter tend to be greatest in the southern Plains; (3) losses have been greater under cotton, sorghum, and other row crops than on land planted to small grains; (4) organic matter loss on fallow land has been as great as on land in row crops; and (5) farm manure and green-manure crops have reduced but not prevented the decline in levels of soil organic matter.

Even before this study was completed, the need was clearly indicated for field experiments to develop practical methods for

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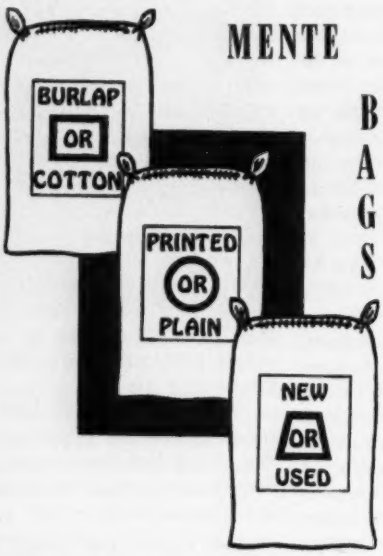

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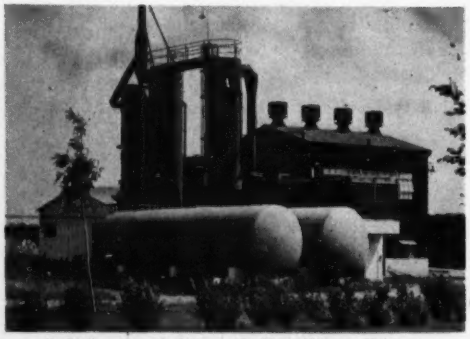

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maintaining soil organic matter levels in the Plains. Experiments were started during 1949 and 1950 to explore several possibilities. Slowly soluble nitrogen fertilizers have been used on grain and grass crops without satisfactory results. The recently proposed English treatment of soaking small-grain seed in phosphorus solutions is currently being studied. Simple nitrogen and phosphorus fertilizer tests with spring-and fa l-planted grains have been started at nearly all of the dry-land field stations, and more comprehensive soil improvement studies with fertilized grasses and small grains have been started at a smaller number of locations.

Fertilizer experiments with wheat on Weymouth fine sandy loam soil at Woodward, Okla., show that profitable fertilizer response cannot be determined as quickly or positively as in more humid areas. During the first six years of the experiment (1941-46) there was a significant response to nitrogen and phosphorus combined, but the average increase was not high enough to be profitable. In 1947 and 1949 increases in yield of more than 20 bushels of wheat to the acre were obtained, and the average increase for the whole nine-year period is high enough to be profitable.

Long-range experiments on rotations and sequences are providing the data needed by farmers to adjust their cropping program on land in the Great Plains. Results with other grains, row crops, and hay crops are equally valuable for determining the acreage adjustments that can be made with the least reduction in the farm income. The findings on the place of summer fallow in the western United States, for example, are now being used as a base for recommendations on the extent that fallow should be used on former wheatlands.

Dr. Frank Viets examining Safflower experiment in the Columbia River Basin, Washington.

Soil and Fertilizer Phosphorus Studies

Radioactive phosphorus has come into use as a major tool in phosphorus studies in the last two or three years. During 1949 and 1950 the radioactive isotope of phosphorus was used successfully in growth-chamber studies on the nutrition of plants and in highly refined studies of the surface chemistry of phosphates in soils.

Methods have been perfected for measurement of the surface phosphate ions of calcareous soils. There appears to be a relationship between surface phosphates of soils and the amounts extracted by various reagents. A highly significant negative correlation has been found between CO_2 soluble phosphorus and the $CaCO_3$ content of soils.

Progress in research with radiophosphorus has been so rapid that during the 1949 crop year it was possible to enter into large-scale cooperative field studies with workers in experiment stations in all sections of the country. Fifty field experiments using radioactive phosphorus fertilizers were carried out in 15 States during the year. This program in 1950 involved 22 States and one Canadian Province, with 58 field experiments and nine greenhouse studies.

The experiments involved comparisons of several radioactive phosphorus fertilizer materials, placement of the phosphorus in the soils, different crops, varying rates of phosphorus fertilization, and different soil types. For example, studies on phosphorus utilization by sugar beets, alfalfa, barley, and potatoes in Arizona, Colorado, and Idaho included sources of phosphorus, placement, and rate and time of application. Calcium metaphosphate was less available than superphosphate in the early stages of growth but equal thereafter. Ammonium phosphate and superphosphate were equally available. Liquid phosphoric acid applied June 29 was about equal to treble superphosphate applied a month earlier, but superior to treble superphosphate when both were applied June 29. Phosphoric acid applied in irrigation water moved downward at least 12 inches, although 85 percent of the total was found in the top four inches of soil.

Pelleted fertilizer being sprayed from airplane on farm in Manassas, Virginia.

Columbia Basin Bulletin

The Columbia Basin project is located in the "big bend" of the Columbia River in south-central Washington, where approximately one million acres have been classed as irrigable. The irrigation water supply for the project will be pumped from the Columbia River, at Grand Coulee Dam, and will be delivered to the farms through a system of reservoirs and canals. Water from the dam may be available to a few thousand acres of the first farm units in 1952—with still larger acreages coming under irrigation in subsequent years.

The problem—never before solved—is how to anticipate the soil deficiencies, the best crops and varieties, the crop diseases and pests, the irrigation problems, and have them worked out in advance of settlement. Representatives of the Washington Agricultural Experiment Station, The Agricultural Research Administration of the United States Department of Agriculture, and the Bureau of Reclamation of the United States Department of the Interior all contributed to the planning and execution of the program. Facilities were made available in 1945, scientific staffs recruited, and water supplies created. In some cases water was pumped from the river, in others from deep wells, and modern diversified irrigation farms were established in the middle of the desert from two to five years in advance of delivery of irrigation water to the surrounding farms.

The results of this predevelopment irrigation research have been drawn together and summarized in Washington Agricultural Experiment Station Bulletin 520, entitled "Soil, Water, and Crop Management Investigations in the Columbia Basin Project." This is a cooperative effort by the Washington Agricultural Experiment Station and the Bureau of Plant Industry, Soils, and Agricultural Engineering.

This bulletin deals with the soils, the crops, irrigation methods, fertilizer recommendations, disease and insect pest control—all the phases of land management that could be studied during the brief period this research work has been under way.

It would be impossible to measure the contributions of earlier basic and applied research to the Columbia Basin research program—but they have been many. Only with a large volume of practical and theoretical research results available was it possible to work out the applications to these new conditions in such a few years. Many problems still exist and new ones will arise, but as a result of this research the new farmer in the Columbia River Basin project will take over his farm with a better knowledge of the problems to be expected and of methods of solution or control than ever before has been the case.

Missouri Basin Irrigation

The lessons learned in predevelopment irrigation research methods in the Columbia Basin are being applied directly in the new Missouri Basin irrigation project.

The introduction of irrigation into the central and eastern part of the Missouri Valley will create problems that have not been encountered in previous irrigation projects in the United States. Heretofore, most of the irrigation has been confined to alluvial soils in arid climates with little soil profile development. Land leveling of such soils has not impaired their productivity as seriously as it will on the more fully developed soils in the subhumid climates, especially in the central and eastern part of the Missouri Basin, where irrigation is not now generally practiced. A large part of the proposed irrigation is also on glacial soils where irregular or kettle-hole topography will make distribution of water and adequate drainage difficult.

Water artificially applied must

be distributed uniformly for maximum efficiency. The soils, the topography, and the climate of the Missouri Basin make this difficult. Much of the topography is rolling and the soils thin. This makes leveling of these lands impractical. Furrows or gradual borders become hazardous because of rains of high intensity that may occur at any time. New methods of water application will have to be developed or existing surface and sprinkler methods modified to meet the conditions prevailing in the areas proposed to be irrigated. These methods will have to be integrated with the new cropping patterns that will be developed.

As surface and ground waters contain variable amounts of salts, the problem of water quality becomes an extremely important one in avoiding the formation of saline and alkali soil areas. Adequate drainage is required to prevent salt accumulation and to reclaim saline areas. Problems of salinity and alkali control will be further aggravated by impermeable subsoils and difficult drainage conditions and by the salt-bearing nature of some of the underlying geological materials, such as the Pierre shale.

Headquarters for irrigation research in the Missouri Basin has been set up at the United States Northern Great Plains Field Station at Mandan, N. Dak. During 1950 the small scientific staff was able to begin laboratory work on the soils of the area and to initiate field experiments at the Redfield and Huron, S. Dak., Mandan and Bowbells, N. Dak., development farms. These field studies deal with irrigation methods, fertilization rates, and crop variety comparisons for corn, sugar beets, potatoes, alfalfa, and other legumes and grasses for forage and for seed production.

New Irrigation at Tucumcari

The new Tucumcari, N. Mex., project will bring irrigation water to 45,000 acres of farm land. Some units were suppied water for the 1947 growing season, more were irrigated in

---

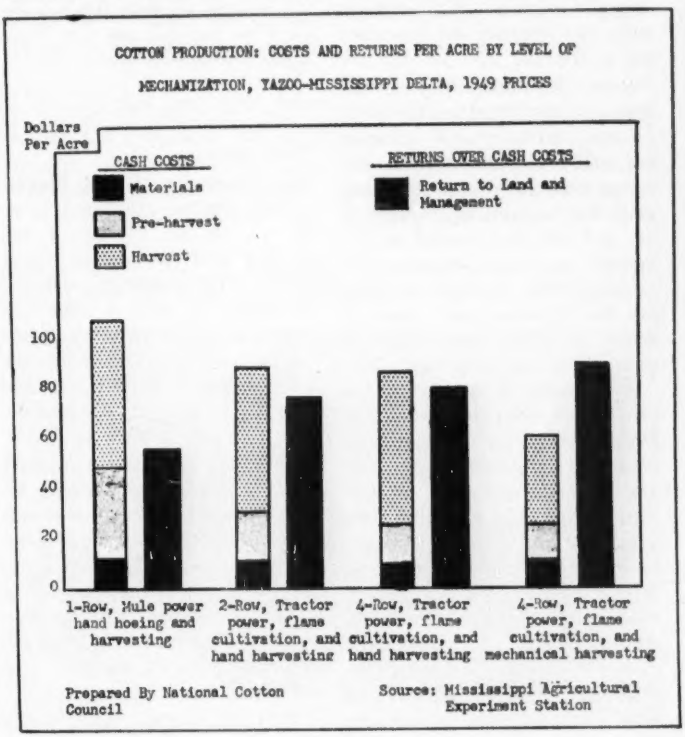
MECHANIZATION PAYS OFF

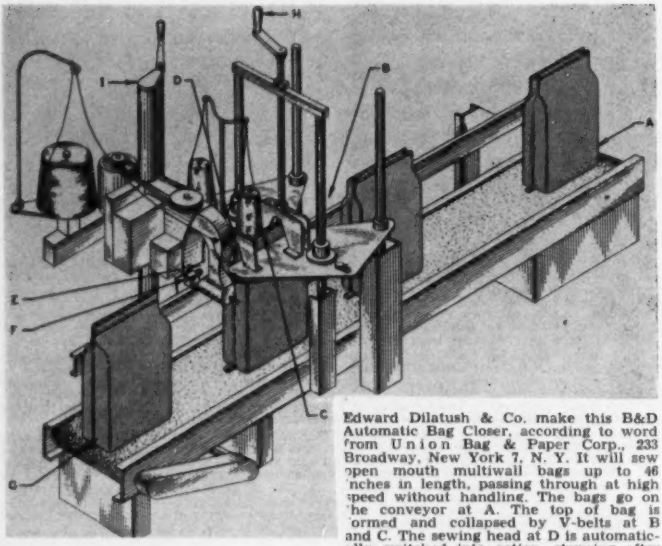
Returns over cash production costs increased to $90.21 per acre when the most highly mechanized methods were used on a cotton enterprise in the Yazoo-Mississippi Delta, according to a report issued recently by the Mississippi Agricultural Experiment Station in cooperation with the Bureau of Agricultural Economics. When mule power and hand methods were used, returns were $56.61 per acre.

The study, prepared by Grady B. Crowe and J. P. Gaines, summarizes costs and returns for four different levels of mechanization. Cash production costs amounted to $109.71 with one-row mule equipment, hand hoeing and harvesting; $89.81 with two-row tractor power, flame cultivation, hand hoeing and harvesting; $6.07 with four-row tractor power, flame cultivation, hand hoeing and harvesting; and $61.01 with four-row tractor power, flame cultivation, hand hoeing and mechanical picking.

When yields averaged a bale per acre, the gross value of lint and seed per acre amounted to $166.32, except when the cotton was harvested mechanically. When picked by machines the value was $151.22. This decrease was due to the fact that some cotton was lost in the field and the remaining mechanically harvested cotton was lower in grade than hand picked cotton.

The report points out that it should be remembered that highly mechanized operations increase the pressure on management. Effective use of costly and specialized mechanical equipment must be achieved if lower production costs are to be realized.


COTTON PRODUCTION: COSTS AND RETURNS PER ACRE BY LEVEL OF MECHANIZATION, YAZOO-MISSISSIPPI DELTA, 1949 PRICES
Dollars Per Acre
CASH COSTS
Materials
Pre-harvest
Harvest
RETURNS OVER CASH COSTS
Return to Land and Management
100
80
60
40
20
0
1-Row, Mule power hand hoeing and harvesting
2-Row, Tractor power, flame cultivation, and hand harvesting
4-Row, Tractor power, flame cultivation, and hand harvesting
4-Row, Tractor power, flame cultivation, and mechanical harvesting
Prepared By National Cotton Council
Source: Mississippi Agricultural Experiment Station



Edward Dilatush & Co. make this B&D Automatic Bag Closer, according to word from Union Bag & Paper Corp., 233 Broadway, New York 7, N. Y. It will sew open mouth multiwall bags up to 46 inches in length, passing through at high speed without handling. The bags go on the conveyor at A. The top of bag is formed and collapsed by V-belts at B and C. The sewing head at D is automatically switched into action, stopping after the bag goes through . . . and the bag comes out the other side, fully closed. The handles H and I are for adjusting sewing head and top forming unit.

1943, and the number is increasing each year.

Soils and topography of the area are such that problems of erosion, salinity and chlorosis are already showing up. The soils range from very sandy to heavy clay. The water supply is limited, and data are needed on the amounts of water and the rates of application required by crops on the different soil types in order to obtain most effective use of the available water.

A soil-salinity survey of the project has been completed, and land selected for field experiments in irrigation and drainage methods and crop production techniques. Preliminary studies of soil salinity and permeability indicate that extreme difficulty will be encountered in the management of the heavy, poorly drained lands of the project. Work is under way to determine the best methods and rates of application of gypsum and other soil amendments to increase the permeability of these soils.

Salt Tolerance of Crop Plants

Basic studies are being carried out on all phases of soil salinity and its control. These studies are concerned with the chemistry of salts in soils, the effects on soil structure and biological activity, and with the direct effect of salts in soils and irrigation water on crop production.

Tests on bean plants indicate that the intensity of chloride injury to western crops depends on whether the chloride is present in the soil as sodium, calcium, or potassium chloride. The sodium chloride is relatively nontoxic in comparison with the chloride salts of calcium and potassium.

Further studies with truck crops show the following order of decreasing salt tolerance: Beets, tomato, broccoli, cabbage, cauliflower, lettuce, White Rose potatoes, sweet corn, carrot, onion, cantaloup, cucumber, and green bean.

Tests are being carried out on the relative tolerance of stone fruits to various salts that frequently occur in saline soil. Serious injury took place on many trees subjected to excess calcium chloride during the first season of growth. Some almond trees were seriously injured, and apricot and plum trees showed heavy leaf burn and dieback of the young twigs. The experiment emphasizes that the toxic action of the chloride ion on tree fruits is markedly increased by the presence of excess calcium, in pronounced contrast to the effect of excess sodium.

The relative salt tolerance of six varieties of alfalfa has been tested over a three-year period on field plots artificially salinized by adjusting the amount of salt present in the irrigation water applied. Yields decreased as the degrees of salinization increased. Yield of alfalfa irrigated with water containing 9,000 parts per million of salts only 40 percent of that grown with nonsaline irrigation water.

Studies to determine the relative sensitivity of various crops to the bicarbonate ion, which is present in nearly all irrigation waters, as well as in the soils of the Western States, showed that Rhodes grass, sweetclover, and garden beets are rather tolerant of bicarbonate. Dallis grass, red clover, and beans were quite sensitive and developed serious

chlorosis when grown in the presence of bicarbonate. Bicarbonate interferes with normal intake of iron, phosphorus, and calcium by the plants and also upsets organic-acid metabolism in the tissues. This derangement in metabolism appears to be much more pronounced in the sensitive crops.

Mountain Meadows

In the mountainous region of the Western States, there is a large acreage in high-altitude meadows. In Colorado, Wyoming, Montana, and Idaho alone, the acreage exceeds two million.

At one time many of these meadows yielded in excess of two tons of hay per acre. In the past 20 to 30 years, the yield has been declining. There are many places today where the yield is as low as ¼-ton per acre and in large sections it will not average over ½-ton. At one time, the quality of the hay produced in these high-mountain meadows was very good. The yield and quality of the hay have deteriorated to the extent that at the present time, the very existence of a livestock program is threatened.

Increased yields and higher quality of hay are vital to the entire livestock industry in these regions. This is particularly true because in the high mountainous regions, the winters are long and it is necessary for ranges to produce a considerable amount of hay in excess of that produced for pasturing during the summer months. Sufficient hay must be produced to carry the animals through the winter months.

Intensive research is being started on this problem area in cooperation with the Colorado and Wyoming Agricultural Experiment Stations and other interested agencies. The areas have been examined in detail by field parties to determine the most pressing problems and the areas in which they occur. The field experimental program was also started during the 1950 season. Included are studies on hay and pasture mixtures with legumes and grasses, fertilization with nitrogen and phosphorus, liming, and irrigation rates and methods. Rapid progress is expected in this research program, because of the store of agricultural research findings and techniques available.

Integrated Soil Management Research

Some of the lines of work described above deal with intensive studies of specialized problems in soil chemistry or plant nutrition. Other projects are concerned with the application of results from this type of study in working out the cultural and management requirements of single crops for maximum yields and quality. The farmer, however, must grow his crops in some type of sequence. Preceding crops exert an influence on the quality and yield of crops that follow in a rotation. Any soil treatment made on one crop in the rotation may affect the growth of subsequent crops. These effects may result not only from lime and fertilizer treatments, but also from tillage, irrigation practices, and others as well.

As knowledge of soils and crops is developed to the point where we can select a few of the most promising cultural practices for the most important crops on a given soil type, research can then proceed to the development of optimum soil and water management practices for the entire rotation.

In irrigated areas sugar beets are commonly grown in rotation with alfalfa, with small grain as

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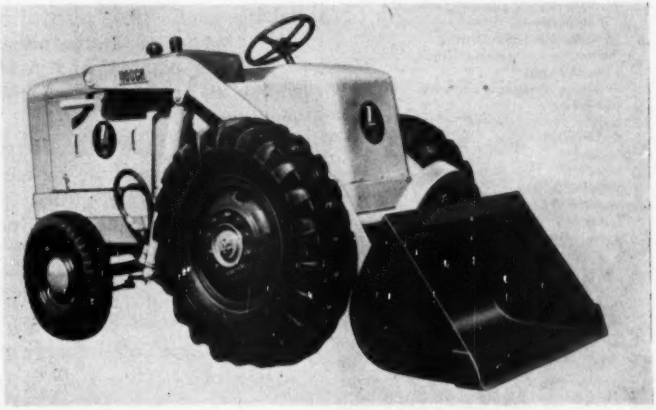

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Coolers
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Dry-Mixing Units
Dust-Arresting Equipment
Fume Scrubbing Systems
Hoppers and Spouts
Materials Handling Equipment
Milling and Screening Units
Multiple Hopper Batching Systems
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a nurse crop for the alfalfa, and a cultivated crop between alfalfa and the sugar beets. Although much remains to be learned about the individual requirements of these crops, agricultural knowledge and research techniques have now developed to the point where this type of rotation may be profitably studied as a unit.

Probably the most comprehensive field experiment ever undertaken was initiated at Logan, Utah, during the past two years. The experiment is designed to develop the optimum combinations of soil, water, and crop-management practices for a five-year rotation of barley, two years of alfalfa, potatoes, and sugar beets. The variables include two methods of irrigation (sprinkler and furrow), four rates of irrigation by each method, two levels or nitrogen fertilization, and two rates of phosphate application. The necessary treatment combinations and replications require a total of 1,280 plots, each nine by 25 feet in size, or a total experimental area of 12 acres. The irrigation systems were installed and the alfalfa plots planted in 1949. During 1950, the other crops were planted, and fertilization and irrigation variables were applied.

Very little of the desired type of information will be derived from this experiment until 1955, when one sequence of crops has been completed and the interaction of residual and current treatments can be studied. The greatest value of this experiment will probably be realized during the period of 1960 to 1970.

All during this next 20 years some of the results of this experiment will be of use in practical recommendations to farmers and in other research programs. As this rotation experiment progresses, the measurement of crop quality and residual soil effects will doubtless be greatly improved. This will come about as the result of new knowledge and new methods being developed in other more specialized segments of the agricultural research program.

Agricultural Machinery Division in OFAR

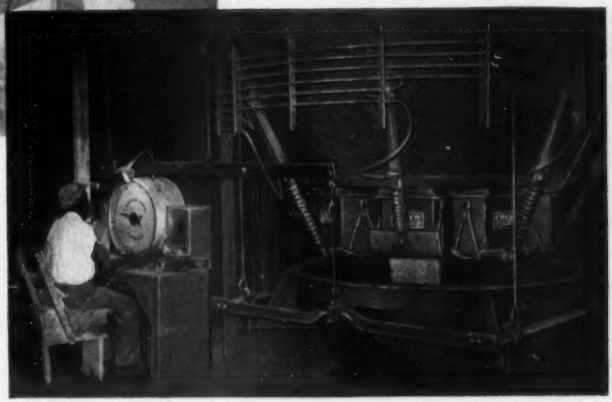
A Division of Agricultural Machinery and Supplies has been re-established in the Office of Foreign Agricultural Relations, the U. S. Department of Agriculture announced.

The division will function within OFAR's International Commodities Branch. It will give priority to the preparation and analysis of information bearing upon defense problems, and its statistical and economic work will relate to production and consumption of, and international trade in farm machinery, fertilizers and pesticides. The division carried on similar activities relative to agricultural machinery during the latter part of World War II and the immediate postwar years.

Horace G. Bolster, for 12 years an Extension Service economist in Montana, and later American agricultural attache in Iran and the Netherlands, has been named acting head of the division.

IS THIS YOUR PLANT?

Obsolete batching methods formerly used in this plant accounted for the congestion and gross waste of man power shown by this unposed photograph.



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NAC REPORT

Pictures and Story *by* VIRGINIA CRENSHAW

NAC Holds Spring Meeting In Miami

April 4-6 were the dates; Flamingo Hotel, Miami Beach, the place for the National Agricultural Chemicals Association's Spring meeting which assembled a good crowd for the three day program, offered good opportunity for informal conferences and excellent entertainment in the nation's number one playground. Host to the gathering, first to be held in the Southeast, was the Florida Agricultural Research Institute of which D. N. Barksdale of Mulberry, Fla. is president. W. Mercer Rowe, Jr., Tampa, v-p of FARI, and chairman of the committee on arrangements, did an excellent job of planning.

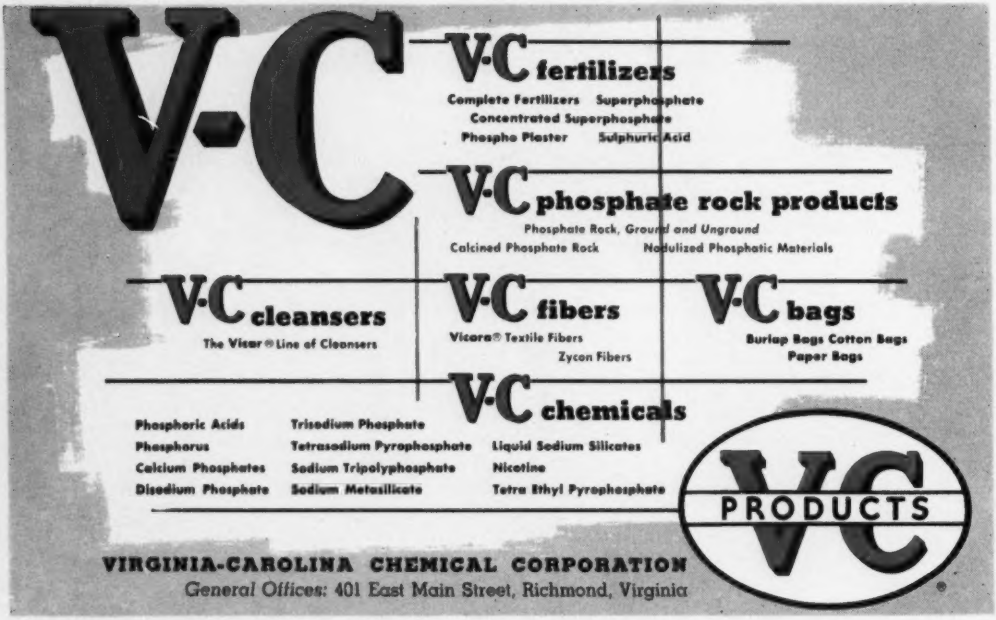
General business sessions were scheduled for the mornings of the first and third days; Directors' meeting, committee meetings, and a conference of formulators and basic manufacturers on the second day. Entertainment throughout the convention was plentiful: the Florida Agricultural Research Institute sponsored the Florida Cypress Water Ski Show, a special feature race for NAC members at the Miami Beach Kennel Club, and a tropical exhibit of hibrid hibiscus and rare tropical foliage. Still in season were jai alai, dog and horse races, and sightseeing, a year-'round-favorite. On the first day of the convention there was a general luncheon with guest speaker; that evening the reception and dinner.

Ernest Hart, NAC president, opened the first day's program with a brief address which expressed confidence that the combination of industry's high production and efficient system of distribution would provide for the American farmer the materials he needs to protect his crops and thus meet his responsibilities to the defense effort. At the same time, Mr. Hart urged farmers to make known their pesticides requirements immediately in instances where this has not already been done. The industry's production, he said, could be pushed even beyond the billion pound total required if necessary, provided additional supplies of chlorine, bensol, sulfur and other raw materials were made available to the pesticide manufacturers.

Dr. Avery S. Hoyt, Chief, Bureau of Entomology and Plant Quarantine, USDA, Washington, D. C.:—Dr. Hoyt, the morning's second speaker, said that the factors involved in greater production were better varieties, fertilization, mechanization and new and better agronomical practices. All of which is not enough—farmers must control destructive insects to produce quantity and quality crops from seed planting 'til harvest. Insect control activities add yearly more than 10% additional to quantity of crops;

KEY TO PICTURES

1. Gus Ashcraft, Ashcraft-Wilkinson Co., Atlanta, Mr. & Mrs. Wm. King Self, Riverside Chemical Co., Marks, Miss.
2. A. F. Fuchs, and John P. Bryan, Naco Fertilizer Co., Charleston.
3. Trenton Tunnell, Ashcraft-Wilkinson Co., Atlanta, Mr. & Mrs. Mercer W. Rowe, Flag Sulphur & Chemical Co. Tampa, W. J. F. Francis, Pennsylvania Salt Mfg. Co., Tacoma, Mr. & Mrs. Gus Ashcraft-Wilkinson Co., Atlanta, Wm. E. Merritt.
4. Roger W. Roth, and Wm. E. Evans, Commercial Solvents Corp., New York.
5. George Leonard, Tobacco By-Products and Chemical Corp., Richmond, Va., Lea S. Hitchner, Executive Secretary, NAC Association, Washington.
6. L. N. Markwood, National Production Authority, W. R. Allstetter, USDA, Cedric Gran, Economic Stabilization Agency, all of Washington, Ernest Hart, Niagara Chemical Div. Food Machinery and Chem. Corp., Middleport, Lea S. Hitchner, Executive Secretary, NAC Association, Washington.
7. Theo Riedeburg, Riedeburg, Assoc., New York, Walter Allstetter, USDA, Washington, William Schwab, Armour & Co., Chicago.
8. Leo R. Gardner, California Spray-Chemical Corp., Richmond, Calif., Bob (R.A.) Lamoree, Stauffer Chemical Co., San Francisco, A. W. Mohr, California Spray-Chemical Corp., Richmond.
9. Hal C. Dilworth, National Cotton Council, Dr. J. M. Bellows.
10. Dale A. Chapman, Chapman Chemical Co., Memphis, George Krieger, Ethel Corp., N. Y.
11. O. C. Behse, Agricultural Chemicals, Inc., Llano, Texas, Dr. C. L. Smith, and T. H. Tennent, both of Ethel Corp., N. Y.
12. Cecil Henderson, Niagara Chemical Div. Food Machinery & Chemical Corp., Jacksonville, L. C. Gopp, Michigan Chem. Corp., St. Louis, Mich., Frederico Morales, Tropical Agriculture, Havana, Mrs. Cecil Henderson, George Leonard, Tobacco By-Products Co., Richmond, Leonard Harris, Mercantile Agencies, Inc., New York.
13. Honored convention guest, Frederico Morales, Tropical Agriculture, Havana, and his daughter, Mrs. Cecil Henderson, Jacksonville, Fla.
14. Mrs. W. J. Lilpfert, Ft. Valley, Ga., W. J. Lilpfert, Woolfolk Chemical Works, Ltd., Ft. Valley, Mrs. John Alden, Ft. Valley.



estimated potato production is increased by more than 30%; alfalfa seed yields are doubled; fresh fruits, vegetables and nuts are available almost the year around mainly through the use of insecticides. The nation's health and food standards would not be possible today without insect control measures, he said. The government's entrance into the field goes back nearly 100 years and federal entomologists have cooperated with insecticide chemists, manufacturers and formulators through many of these years. An estimated billion pounds of formulated insect control chemicals will be made available in '51 to produce food, feed and fiber crops. He closed with a word of caution—avoid recommending any insect control problem that might result in contamination. Control of certain insects can be obtained effectively and economically without insecticides by control of planting dates, by furthering effectiveness and availability of insect parasites. Insecticides play an important part today because they fill our requirements at the moment. But this may not always be equally true, he said. The industry has the responsibility of thoroughly testing any new insecticides before they are offered to the public not only for their value in controlling destructive insects but also to determine whether there may be possible health hazards.

Dr. R. M. Salter, Chief, Bureau of Entomology & Plant Quarantine, USDA, Washington, D. C.:—

Research has recently developed a tremendously wide range of new farm uses for chemical materials which have become a much more potent tool for increasing crop production and labor saving now than during the last war. As recently as 1945 the use of chemicals for weed control in agriculture was highly restricted. Last Year, farmers applied herbicides to more than 30 million acres of cropland in the U. S. Spectacular progress has been made with insect control and in application of chemical fertilizers and scores of new advances have been made in the use of chemicals for controlling weeds, fungus diseases, soil pests, and for retaining and improving crop quality. While 2,4-D is the most widely used herbicide, practical

(Continued on page 57)

IMPORTANT ANGLE ON FARM PROFITS

Plants are not the only things on a farm that depend upon good roots!

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Associations

NFA

JUNE 11-13

Members and guests of the National Fertilizer Association will learn the views of leading authorities on national problems when they gather for the 26th annual June convention at The Greenbrier, White Sulphur Springs, West Va., June 11-13. Judging from advance registrations, a capacity attendance is in prospect.

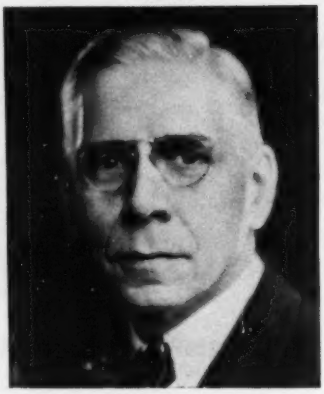
Speakers who already have accepted invitations to address the group are Senator Clinton Anderson (D.-New Mexico), former Secretary of Agriculture; E. G. Nourse, former chairman of the President's Council of Economic Advisors, who has just received one of the John Simon Guggenheim fellowships for study in private enterprise; and Edward J. Condon, President of the Friends of the Land and Assistant to the President of Sears Roebuck and Co.

On the opening day, June 11, the Association's Board of Directors headed by J. E. Totman, president of Summers Fertilizer Co., Baltimore, Md., will meet. Also, the Plant Food Research Committee of NFA will hold an open meeting, the chief feature of which will be a panel reviewing recent research on corn growing, over which Proctor Gull, chairman of the corn subcommittee will preside.

In addition to the general sessions on the 12th and 13th, several social and sports events have been arranged. For the ladies, a garden party will be held on June 11 and a bridge party on June 12. There also will be golf and tennis events for the ladies and golf, tennis and horseshoe pitching contests for the men.

Anderson

Nourse



Condon

APFC

JUNE 14-17

Nationally known members of Congress, Government agriculture officials, soil scientists, representatives of the farm press and radio farm directors and spokesman for County Agents and Vocational Teachers will appear on the program for the Sixth Annual Convention of the American Plant Food Council, to be held at The Homestead, Hot Springs, Virginia, June 14-17, according to announcements by Paul T. Truitt, Council President.

W. T. Wright, Vice President, F. S. Royster Guano Company, Norfolk, is Chairman of the 1951 Convention Committee and other members are: John V. Collis, President, Federal Chemical Company, Inc., Louisville; J. A. Howell, President, Virginia-Carolina Chemical Corp., Richmond; A. F. Reed, Vice President, Lion Oil Company, El Dorado and Paul Speer, Vice President, United States Potash Company, New York City.

Approximately 500 Council members and their guests are expected to establish a new convention attendance record.

Mr. Truitt will open the con-

vention program with the annual address of the Council President Friday morning, June 15.

United States Senator Allen J. Ellender (D-La.) Chairman of the Senate Committee on Agriculture and Forestry, will be the second speaker on the opening day. His subject will be "Agriculture . . . Our First Line of Defense."

Dr. H. E. Myers, Head of the Agronomy Department, Kansas State College at Manhattan, will be the final speaker on the opening day. His subject will be "Fertilizer Use in Relation to Animal Nutrition."

Secretary of Agriculture Charles F. Brannon will be the first speaker at the second session of the Convention Saturday morning June 16 on the subject of "Farming in a Defense Economy."

Another high-light of the Convention will be an agricultural forum Saturday morning on the subject of "Fertilizer's Contribution to Better Living." The speakers will be:

Dr. Paul D. Sanders, Editor, The Southern Planter, Richmond, Moderator; Ferdie Deering, President American Agricultural Editors Association; Dr. R. Frank Poole, President Association of Land-Grant Colleges and Universities; Phil Alampi, President National Association of Radio Farm Directors; Edwin Bay, President National Association County Agricultural Agents; Robert A. Wall, Vice President National Vocational Agricultural Teachers Association.

A brief business session at which eight new members of the Board of Directors will be elected, is scheduled for Saturday morning at 11:45.

Representative Walter H. Judd (R-Minn.) will be the banquet speaker Saturday evening, June 16. His subject will be "Danger Signs in Our Domestic Economy." A graduate of the University of Nebraska, where he earned his B.A. and M.D. Degrees, Mr. Judd is widely known as an authority on American foreign policy. He was elected to the 78th, 79th and 80th Congress. During World War II he entered the United States Army as a private and was discharged as a Second Lieutenant in the Fie'd Artillery. He is a member of Phi Beta Kappa.

A meeting of the Board of Directors of the Council is scheduled for June 17 at which time the Executive Committee and Committee Chairman will be elected.

Entertainment features of the Convention will include the annual Golf and Tennis Tournaments and Special Events for Ladies. Committees for the 1951 sessions are as follow:

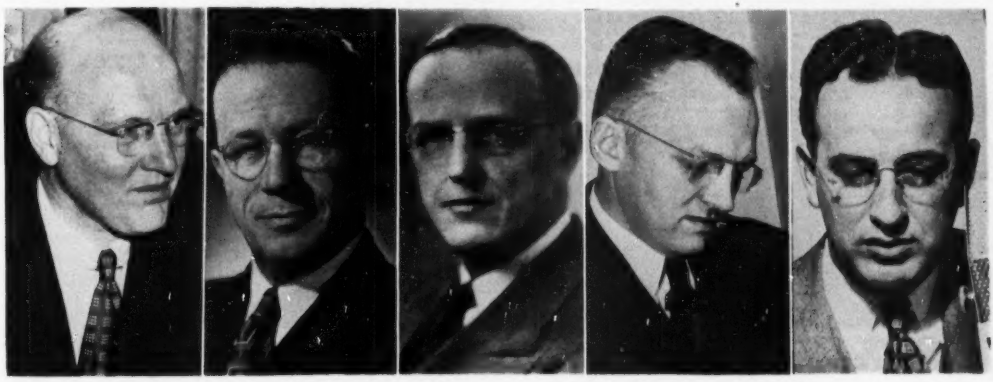
(Continued on page 63)

CANADA

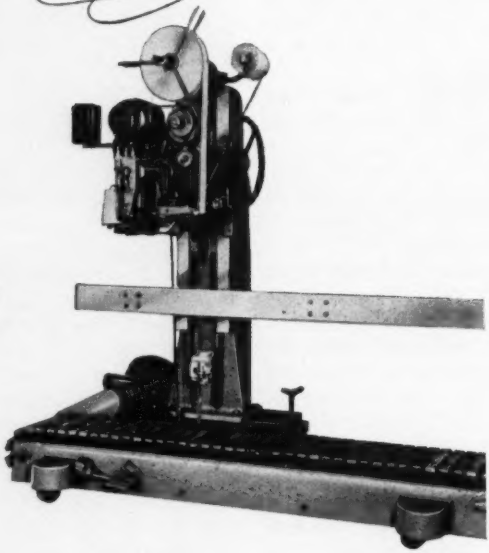
JUNE 25-29

The sixth annual convention of the Plant Food Producers of Ontario, Quebec and the Maritime provinces will be held June 25-29 at the Seigniory Club, Montebello, Quebec.

SOME OF THE APFC SPEAKERS: C. F. Brannan, Secretary of Agriculture; Senator Allen J. Ellender, Louisiana, Chairman of the Senate Committee on Agriculture and Forestry; Representative Walter H. Judd, Minnesota, authority on foreign relations; Ferdie Deering, editor The Farmer-Stockman, president of the American Agricultural Editor's Association; Phil Alampi, director of WJZ's Farm News Program, and president National Association of Radio Farm Directors.



THE BAG CLOSER WITH THE "built-in Guardian Angel"



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That isn't very hard for a Bagpaker to do, because Bagpak designers have put in *extra strength*—heavy duty working parts—welded steel construction—all improvements that reduce lost time due to breakdowns. The savings on this alone can be tremendous over the years.

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Lion Aqua Ammonia — This product is available to manufacturers for use in the formulation of mixed fertilizers or for sale as direct application material. Normally about 30% ammonia, its content can be controlled by order to suit your needs.

Lion Nitrogen Fertilizer Solutions — Made specifically for the manufacturing of mixed fertilizers, these products supply both ammonia nitrogen and nitrate nitrogen in the ratios desired. They are easily handled and available in three types designed for varying weather conditions, and for formula requirements in the production of fertilizers that cure rapidly, store well and drill evenly.

Lion Ammonium Nitrate Fertilizer — The improved spherical white pellets in this product contain a guaranteed minimum of 33.5% nitrogen. They flow freely, resist caking and store much better. Lion Ammonium Nitrate Fertilizer is shipped in 100-pound, 6-ply bags with two moisture-proof asphalt layers.

Lion Sulphate of Ammonia — This new, superior-type sulphate is guaranteed to contain a minimum of 21% nitrogen. Through special conditioning of the larger crystals, moisture and free acid content is greatly reduced. These factors, together with the special coating applied, make for greater resistance to caking in shipment or in storage. This product flows freely. It is shipped in bulk and in 100-pound, 6-ply bags laminated with asphalt.

"Serving Southern States"

LION

Technical advice and assistance to fertilizer manufacturers in solving their manufacturing problems is available for the asking. Just write.

LION OIL COMPANY CHEMICAL DIVISION EL DORADO, ARKANSAS

ARKANSAS

The Earle Liquid Fertilizer Company, Earle, has been formed to distribute anhydrous ammonia in that section. Personnel include: **Gene and Buddy Morrison, Everett Hood, Carl West, John Jenkins and Alvin Thompson,** all local farmers.

CALIFORNIA

Globe Fertilizer Company, Los Angeles, was back in business three weeks after the fire which did $60,000 damage to equipment and supplies. President **Fred R. Little** praises the splendid cooperation of paper suppliers, printers, other members of the fertilizer industry and his customers.

FLORIDA

International Minerals & Chemical Corp. will construct a new phosphate chemical plant at Mulberry, which will recover uranium as a by-product. The initial objective is to produce refluorinated phosphate for animal feed and multiple superphosphate for plant food. The plant is to cost 10 million dollars and **Rust Engineering Co.,** Pittsburgh, has been retained as engineer-constructor. The first buildings to go up will occupy about 27 acres adjacent to International's phosphate mining property. It is estimated the plant will be in operation within a year, producing 100,000 tons of defluorinated phosphate annually.

Swift & Co., Winter Haven plant is to be expanded 50%, according to Manager **J. W. Whitaker.** On the drawing board are increased storage, better shipping and loading facilities. Combined fertilizer production will be some 60,000 annual tons upon completion of the new facilities. The plant also produces insecticides.

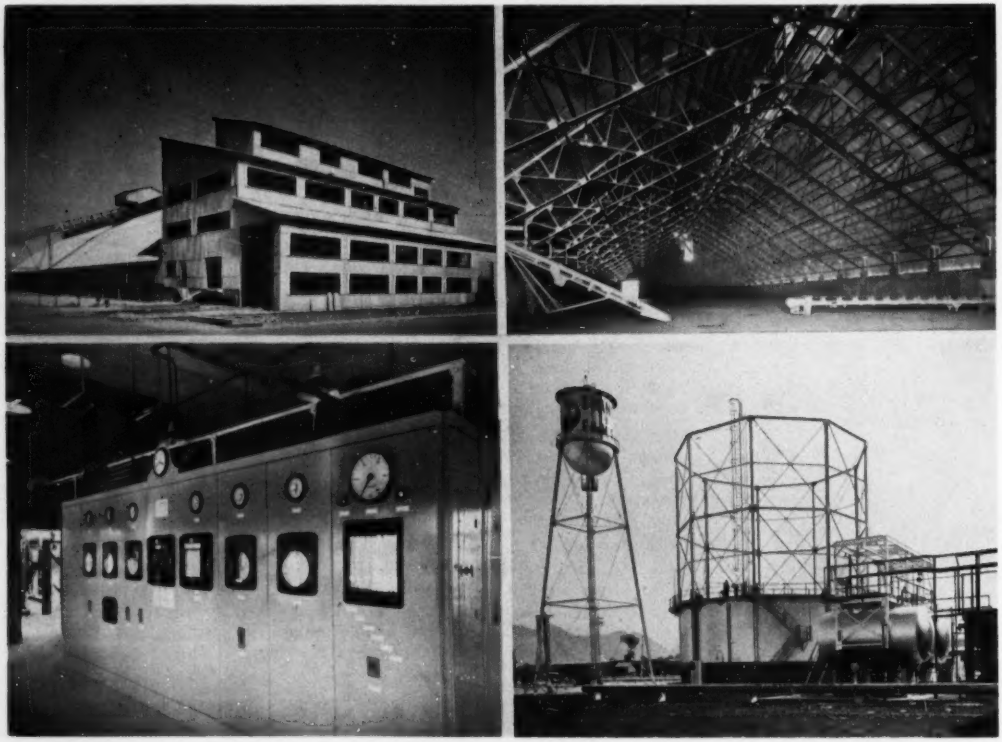
IDAHO

Farmer's Central Fertilizer Company, Montpelier, is considering a million dollar development.

* * *

Gates Brothers-Idaho Farm Bureau plant, Wendell, has developed a process to use spent akylation sul-

Guanos y Fertilizantes S.A., leading Mexican fertilizer plant will soon be producing 70,000 annual tons of low-cost ammonium sulfate from a new Chemico plant, being engineered by Chemical Construction Corporation, New York. Pictured are the exterior and interior of the ammonium sulphate storage building, the control panel of the gas reforming plant, and the gas holder.



Around the Map

The Mayor of Athens, Georgia is seen here presenting to Harry Hodgson a Certificate of Cooperation which Empire State Chemical Company won from ECA when they threw open their plant for thorough inspection by European teams sponsored by the Anglo-American Council on Productivity. Shown are Councilman Dick Thompson; Empire v-p and superintendent C. P. Belding; Harry Hodgson, Empire secretary-treasurer; Mayor Jack R. Wells; Mayor Pro Tem Luther T. Bond . . . and in the background, other members of the City Council.

furic in production of triple superphosphate. Technical director **Gerald H. Lewis** and his staff are responsible for the development, according to general manager **George F. Wilkins.**

* * *

Westvaco. Don, set up an elemental phosphate plant which went into operation in August 1949. Before operations began in the first furnace, a second was ordered. A third furnace is now under construction there, requiring almost the entire output of a major hydro plant at Snake River.

ILLINOIS

Bemis Bro. Bag Co. has completed a half million dollars of multiwall plant and storage facilities at Peoria. The new buildings, 330' x 200' are in addition to the company's multiwall paper shipping sack manufacturing plant there.

MARYLAND

Davison Chemical, Baltimore, has a safety record which shows that the manufacturing of chemicals need not be extremely hazardous. In 1950 their safety record in five of their ten plants was entirely unblemished, exceeding the 1949 record, when Curtis Bay and the Phosphate Rock division in Florida won Safety Council and Bureau of Mines recognition, according to **A. B. Pettit,** company supervisor of health and safety.

"For example" pointed out Mr. Pettit, "On April 30 last year, Curtis Bay broke its all-time record by completing 1,646,388 man hours without a lost-time accident," he said. "As 1950 closed, it was again pushing the million-hour mark and passed that milestone on January 6th of this year, only to have it terminated the next day by an accident.

"The Phosphate Rock Division had completed 426 days (1,087,835 man hours) as of December 31st to prove that mines can be operated safely. However, on January 25th, an accident brought to an untimely termination the splendid record that had been achieved.

"As of December 31st, four other plants had worked over a year without a lost-time accident, as follows: Savannah, 1193 days (406,320 man hours); Perry, 680 days (189,198 man hours); New Orleans, 694 days (107,783 man hours) and Alliance, 933 days (83,667 man hours). Perry had its accident-free run terminated by an accident on February 2nd."

The improvement in the accident record in 1950 over 1949 as cited by Mr. Pettit was:

Mr. Pettit also noted that last year Davison received more than $33,000 in return premiums on its retrospective workmen's compensation policies—a return that was earned by the effective safety program in the plants in 1949 in Florida, Georgia, Indiana, Iowa, Louisiana, Maryland, and Tennessee.

"The money thus saved, while important, does not cover the cost of the safety program," Mr. Pettit said. "Further it does not reflect the time saving. The most important savings are in the pain and economic loss to employees and in the improved efficiency that goes hand in hand with improved safety and housekeeping."

MISSISSIPPI

International Paper Company's president, John H. Hinman has announced plans for doubling the capacity of the new dissolving pulp mill at Natchez. This mill was opened last Spring and has an annual capacity of 105,000 tons.

NOTE:

NFA reports 1951 Fertilizer Consumption total as 18,346,132 short tons—an 11 percent increase over calendar year 1949.

Mississippi Chemical Corporation, Yazoo, is now on a 24-hour day basis, with a daily ammonium nitrate quota of 140 tons, and **Owen Cooper,** executive v-p, has already announced plans for a ten million dollar expansion program.

* * *

Magnolia Fertilizer Company, Vicksburg, is among the properties acquired by the **Russell Company,** Jackson, when it took over the **P. P. Williams** wholesale company of Vicksburg. **Charles H. Russell** is president of the Jackson concern; **Col. Alexander Fitz-Hugh** of the Vicksburg outfit.

MISSOURI

Missouri Plant Food Company plant at Sikeston is now under construction on a 10 acre site. The main building will be 90 x 450 feet, and will have personnel of 80 to 100 at full capacity. Executives are **L. G. Black, Monroe Hoffman, Earl Day, Rex Morgan and Robert Yates.**

TENNESSEE

Tennessee Farmers Coop, Lavergne, is now producing at the rate of 200 daily tons. Manager **Robert H. Powell** shipped the first car in mid-April, a little more than six months after construction was begun. Application service is being rendered.

TEXAS

Niagara Chemical Company, Pecos has almost completed construction of the new building which will occupy some 10,000 feet of floor space.

VIRGINIAS

Freeport Sulphur Co. has an option on pyrrhotite property in Carroll County, granted by the Virginia Iron, Coal and Coke.

CUBA

Cuba will increase fertilizer imports, to supply the sharply increased need for food production which has developed over the last few years.

ENGLAND

England has begun to build its second Merseyside plant to produce sulfuric acid from anhydrite. The Government has granted priorities for materials and equipment. The plant is expected to cost around ten million dollars, which is being supplied by a group of sulfuric users. **Imperial Chemical Industries** is consultant on the project.

ISRAEL

Haifa Chemical Company, Tel Aviv, is considering the production of sulphuric from iron pyrites found in Cyprus, North Africa and Spain to replace the fertilizer-needed sulphur lost due to cutback in US exports. Meanwhile some 2500 tons of Dead Sea potash will soon be turned over to Israeli farmers.

JAPAN

SCAP announced that ammonium sulfate will be exported to South Korea and Formosa. But that was as of Mid-April.

Commercial Solvents Activities

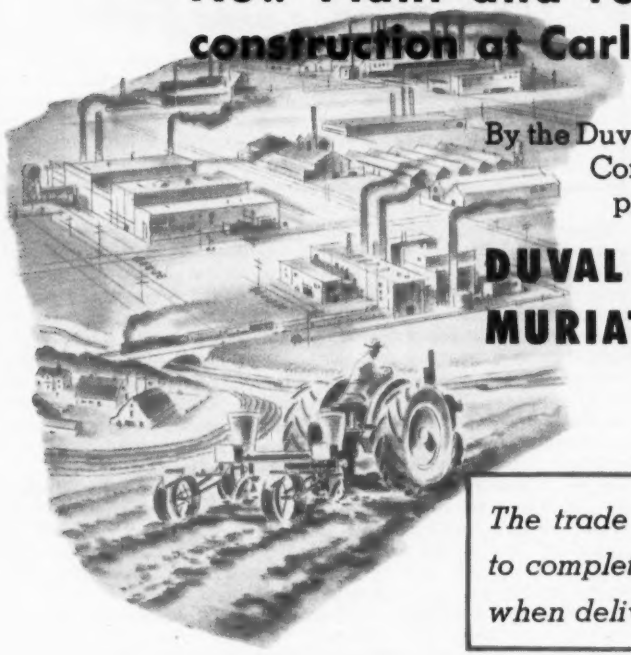
William E. Evans, Jr., who has been transferred by the Commercial Solvents Agricultural Division from Terra Haute to Atlanta, Georgia, where he will handle fertilizer, insecticides and feed supplements throughout the South.

The Agricultural division of Commercial Solvents has opened new and larger offices at Terre Haute, Indiana. Here are Daniel B. Curll, Jr., manager of the division; Dr. Hugh R. Stiles, technical director; Dr. James W. Brooks, in charge of Central states sales; and Hugh C. Bragdon, sales representative.

ANNOUNCING!

A NEW SOURCE OF POTASH

New Plant and refinery under construction at Carlsbad, N. Mex.



By the Duval Sulphur and Potash Company for the production of

DUVAL HIGH GRADE MURIATE OF POTASH

The trade will be informed as to completion of the plant and when deliveries will start.

ASHCRAFT-WILKINSON COMPANY HAVE BEEN APPOINTED AS EXCLUSIVE DISTRIBUTORS FOR DUVAL SULPHUR AND POTASH COMPANY

Address All Communications to

ASHCRAFT-WILKINSON CO.

HOME OFFICE

ATLANTA, GEORGIA

Cable Address ASHCRAFT

NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA. • GREENVILLE, MISS.

DUVAL POTASH FOR BETTER PRODUCTS OF FARM AND FACTORY

Mostly Personal

Dr. Hugh H. Bennett, chief of the **USDA Soil Conservation Service** is being asked to hold over beyond his retirement date. He has been with the Department since 1903, chief of service since 1935.

* * *

Changes in top executive posts in the USDA are as follows: **Ralph S. Trigg** is transferred from the position of Administrator of Production and Marketing Administration to the position of Special Assistant to the Secretary for Commodity Credit Corporation affairs. Trigg is succeeded by **Gus F. Geissler** who previously has held the position of Manager of Federal Crop Insurance Corporation. **Frank W. Woolley** is transferred from the position of Deputy Administrator of Production and Marketing Administration to the position of Special Assistant to the Secretary for Commodity Credit Corporation affairs. He is succeeded by **Harold K. Hill,** formerly Assistant Administrator for Production of Production and Marketing Administration.

John I. Thompson, Assistant Administrator for Marketing, and a close friend of Mr. Trigg's, resigned effective April 5.

At the same time, Administrator Gus F. Geissler, who succeeded Trigg, announced a rescinding of most of the changes made by Mr. Trigg last March 8, with only one exception.

On March 8, Trigg had removed **Alvin V. McCormack** as director of the Agricultural Conservation Programs Branch and demoted him to Idaho State PMA director—a position he held before coming to Washington. In his place Mr. Trigg named **L. B. Taylor,** former Director of Materials and Facilities.

But Mr. Geissler has now sent Mr. Taylor to Materials and Facilities, and named **Thomas B. Joyce,** Deputy Director of ACP, as Acting Director.

Mr. Geissler also rescinded the appointment of **Roy W. Lennarston** as Director of Materials and Facilities and sent him back to his old job as Deputy Administrator for Marketing.

Spencer Chemical Company has announced that **Joe C. Sharp** will become manager of Technical Services, effective May 1, taking over the duties handled by **J. Richard Adams,** who held the title of Director of Technical Services. Mr. Adams has resigned to take up duties with the Bureau of Plant Industry, Soils, and Agricultural Engineering, Division of Fertilizer and Agricultural Lime, in Washington. Mr. Adams was connected with the USDA for some 20 years before taking his post with Spencer in August of 1946. In his association with Spencer he set up a customer service program and was responsible for descriptive literature on the company's industrial and agricultural products. In his Washington assignment, he will engage in all phases of the Division's activities, with special reference to studies of fertilizer production, supplies and consumption.

* * *

John E. Sanford, Armour Fertilizer president, Atlanta, and Mrs. Sanford, have been on a trip to Havana.

* * *

Robert Ruickbie, has retired as manager of the chemical and fertilizer sales department of **Consolidated Mining and Smelting Company of Canada,** and **Arthur Wilkinson** has taken his place. **A. Olaf Wolff** has been made assistant manager.

* * *

Ike Morrison, who has been agricultural agent for **Hi-Yield Fertilizer Company,** Mt. Pleasant, Commerce and Bonham, Texas, has been made agricultural director.

* * *

C. D. Shallenberger, president of **Shreveport Fertilizer Works,** Shreveport, Louisiana, is active in the work of the Mobilization Committee of his parish—a task of coordinating the work of farmers in the defense program.

* * *

A sales manager who began his career as a clerk, became assistant sales manager of the **Virginia-Carolinas Fertilizer Division,** and a young salesman, who served under him in Texas and Louisiana, moved up to become manager of the Shreveport, La., sales office, when the sales department of the fertilizer division announced the appointments of **E. Y. Bass, John French and W. D. Barton, Jr.**

Ed Bass has been appoined assistant to vice-president, general sales office, fertilizer division. Mr. Bass has been active in the sales department for many years. He was honored last year on the occasion of his fortieth V-C anniversary.

John L. French, formerly sales manager of the Shreveport, La., office, has been transferred to the home office in Richmond and appointed assistant sales manager, Fertilizer Division.

Mr. French first became associated with V-C in 1927, as assistant clerk in the Memphis, Tenn., factory office. Later in that same year

he transferred to the Memphis sales office as bookkeeper. After serving in various positions in that office, he was appointed assistant sales manager in 1946 and later in the same year, went to Shreveport as manager.

Billy Barton, as he is known to his many friends, joined V-C in 1944, after graduating from Alabama Polytechnic Institute in Auburn, Ala., his home town. His first V-C assignment carried him to Texas as a fertilizer salesman. In August of 1949, Barton was appointed assistant to manager and was made assistant manager in June, 1950. His recent appointment and promotion to manager of the Shreveport office makes him, at thirty-one, V-C's youngest sales manager.

* * *

Thomas S. Nichols, president and Chairman of the Board of **Mathieson Chemical Corporation,** is on indefinite leave of absence from his company in order to take over duties as special assistant to NPA Administrator Manly Fleischmann. No specific responsibilities are enumerated for him but NPA officials say he will do "whatever needs to be done." High caliber men are rapidly being recruited by NPA with a view to putting into operation a Controlled Materials Plan by midsummer. During World War II Mr. Nichols was assistant to the director of the WPB Chemical Division and a member of the Harriman mission to London.

* * *

E. Nelmes Thomas has been appointed Assistant Manager of the sales promotion division of **Commercial Solvents Corporation,** it has been announced by **H. J. Henry,** vice president in charge of sales.

Mr Thomas became associated with Commercial Solvents in 1946 as technical writer.

* * *

F. H. Ludington, Jr. was made assistant vice president of the 104 year old firm at a recent meeting of Chase Bag Company's Board of Directors. Mr. Ludington, an engineering graduate from Princeton University and former Naval Engineering Officer, was serving in a managerial capacity at the company's Philadelphia branch when appointed to his new position. His new headquarters will be in the Chase executive offices in New York City where he will assist **C. S. Sheldon,** vice president and treasurer in charge of manufacturing, production, and engineering.

* * *

John V. Freeman, who recently retired as Director of the Coal Chemical sales division, **U. S. Steel Company,** after 43 years association in the iron and steel industry, has

William Wellings, Jr., who was recently placed in charge of paper procurement of Arkell and Smiths, multiwall paper bag manufacturers, it was announced last month by S. Y. Carnes, Vice President of Arkell and Smiths, Canajoharie, New York. Wellings will make his office at 500 Fifth Avenue, New York City.

established an office, Suite 3459, at 45 Rockefeller Plaza, New York 20, N. Y., where he will maintain a consultant organization devoted to the technical phases of carbonization of coal and coal chemicals.

* * *

Robert C. Becherer was elected vice-president of **Link-Belt Company** at a recent meeting of the Board of Directors. All officers who

SPENCER CHEMICAL PERSONNEL: Pictured left to right: Harold R. Dinges, product sales director; W. W. Hutto, refrigeration products sales manager; William Schopflin, industrial chemicals sales manager; Claude J. Byrd, agricultural chemicals sales manager; J. Richard Adams, former director of technical services who has resigned to resume his former service with USDA, with which he was connected for 20 years before joining Spencer Chemical in 1946. Joe C. Sharp, not pictured, succeeds him.

Try on Nitrogen— for size!

Shirts use up a lot of cotton. So do dresses. And sheets, towels, bags, cordage, gloves, and thread. Add to that the huge military appetite for explosives and textiles. That's why more cotton is needed this year than ever before. 16 million bales are wanted. To help reach a goal of such size—try on nitrogen! It means greater yield per plant and more harvest per acre. That goes for other crops, too, like corn and wheat, sugar cane and pastures.

Of all the sources of nitrogen, anhydrous ammonia is the most concentrated and the most economical. It is this preferred form that CSC produces at its Sterlington plant in Louisiana. Most of CSC's production is used to increase the crop yield of Gulf Coast farming land.

AGRICULTURAL DIVISION
COMMERCIAL SOLVENTS CORPORATION
17 EAST 42ND STREET NEW YORK 17, N. Y.

CSC

served last year were re-elected. Mr. Becherer joined Link-Belt in 1923, has been general manager of the company's Ewart plant in Indianapolis since 1947 and will continue to hold this position.

* * *

George L. Wirtz, President of the **Atlas Mineral Products Company,** has announced the following personnel changes:

Ray Oster, Hollingsworth Building, 606 South Hill Street, Los Angeles, California will handle the sale of corrosion resistant cements in the Los Angeles area and **Hugh G. Lawson,** 417 South Hill Street, Los Angeles, California will handle the sales of jointing materials for water and sewer pipe in the same area.

Howard Holt, a graduate of Park College, has joined the Technical Service Department.

George Gabriel, formerly Assistant Plant Manager, has been promoted to Engineering Co-ordinator.

Gerald F. Gilbert, Jr., formerly Assistant to Technical Director, has been promoted to Product Director in charge of Chemical Resistant Cements.

* * *

E. C. Johnson, formerly superintendent of the Armour's Jacksonville, Florida, fertilizer plant, and later superintendent of the Bartow, Florida, triple superphosphate plant, has been appointed plant manager of the Bartow operations. **G. C. Gagel** has been appointed plant superintendent at Bartow.

* * *

Dr. Charles Allen Thomas, one of the nation's leading atomic scientists, has been elected president of Monsanto Chemical Company effective May 1. Dr. Thomas has been Monsanto's executive vice president since 1947.

AMERICAN METAL REPORTS ON POTASH SUBSIDIARY

In the annual report for the 63rd year of The American Metal Company, Ltd., New York, is the following report on their potash subsidiary in the Southwest:

Southwest Potash Corporation

"The Company decided in 1950 to enter the potash field through its wholly-owned subsidiary, Southwest Potash Corporation, and to develop the large potash deposit discovered by the Company in 1949 near Carlsbad, New Mexico, referred to in last year's report. This decision was made after extensive drilling of the deposit and after a careful survey of the potash industry and markets. Over 90% of potash is consumed as fertilizer by agriculture, the remainder being taken by the chemical industry. Up to the beginning of World War II, one of the principal sources of potash for the United States market was Europe. Since 1940, domestic producers have supplied almost all potash consumed here. They have steadily increased their capacity, first to fill the gap left when European production was cut off from this market by the war, and second to satisfy a growing demand which has surpassed prewar levels. Since the war, European potash has returned to this market. Domestic producers, even with expanded facilities, are still operating at capacity. In addition to Southwest Potash, one other new American producer of potash plans to enter the field, probably in 1951.

"The Company's potash deposit, like others in the Carlsbad area, is located mainly on Government property. The potash-bearing lands are leased to Southwest Potash Corporation on a royalty basis. By the year end, design and engineering work on the mine and plant were well advanced, two circular shafts 20 feet and 15 feet in diameter were being sunk, and construction of surface installations, including power line, railroad and a 24-mile water pipe line, had been started. Barring unforeseen delays, production should begin in the latter half of 1952.

"The mine and mill will be capable of handling 2,500 tons of ore per day, which will be treated by the flotation process to produce standard muriate of potash (KCl) for use as fertilizer with a minimum content of 60% K_2O (the unit of measure of potash). The initial annual capacity of the plant will be approximately 185,000 tons of K_2O. The facilities are designed for ready expansion at such time as market conditions justify.

"Total deliveries by United States potash producers in 1950 are estimated at approximately 1,255,000 tons of K_2O. Total United States consumption and exports of potash in 1950 are estimated at approximately 1,440,000 tons of K_2O. Total imports into the United States in 1950 are estimated at approximately 185,000 tons of K_2O."

In the Field of

ALLIED FARM CHEMICALS

DETERMINATION OF DITHIOCARBAMATE RESIDUES ON FOOD CROPS

Summary of paper by W. K. Lowen of the Grasselli Chemicals Department, E. I. du Pont de Nemours and Company, Inc., Wilmington, Del., presented before the Division of Agricultural and Food Chemistry at the 119th national meeting of the American Chemical Society April 4, 1951.

The growing use of organic compounds on edible fruits and vegetables for the control of various plant pests has stimulated interest in methods for the determination of residues of such compounds. Included in this category are certain derivatives of dithiocarbamic acid which have recently come into wide use as fungicides on orchard and garden crops because of their effectiveness against many different plant-disease organisms and because of their low toxicity to the host plant.

A modification of a conventional technique for the analysis of dithiocarbamates in microquantities has been successfully applied to the determination of residues of ferbam, ziram, and zineb fungicides. By use of this analytical method, whereby residues of less than lppm (part per million) may be determined, it was found that the residues of various dithiocarbamate fungicides on such food products as celery, tomatoes, cherries, cabbage, and green beans were significantly reduced by allowing several days between final treatment and harvest, and also by washing or canning.

In the case of celery treated with zineb, for example, the crop harvested on the day of final treatment had an average dithiocarbamate residue before washing of about 6.0 ppm. When, however, there was an interval of eight days between the final treatment and harvesting, the residue ran about 1.5 ppm and after ten days only 0.40 ppm. (One ppm corresponds to less than two one-thousandths of an ounce of residue per hundred pounds of crop.)

The effect of washing is shown by an experiment with tomatoes which had been sprayed with a zineb formulation. Whereas the residue on unwashed tomatoes harvested five days after the last treatment was 0.6 ppm, washing reduced the zineb residue to only 0.15 ppm. Similar fresh cherries which showed a ferbam residue of 3.6 ppm were found to have a residue of only 0.09 ppm after canning.

Likewise of interest to growers and processors of fruit and vegetables is the fact that no significant build-up of zineb residue was encountered when the frequency and number of treatments were increased in order to afford protection during long growing seasons. As might have been anticipated, it was found that crops having a leafy or pubescent surface retained considerably higher residues of dithiocarbamate than did those with a smooth surface.

Powell Proud of Personnel Program

A personnel program "as broad in benefits as any, and surpassing most," has been introduced to the employes of John Powell & Co., Inc., suppliers of insecticide materials, and to the employes of its several affiliated companies.

The program is unusual in that it is completely non-participating—that is, employes are not required to contribute to it—although the benefits are very broad and include part ownership in the Company.

Upon employment, new employes immediately share in the benefits of overtime, accident and holiday policies, continuance of seniority rights in event of temporary absence, and disability insurance wherever state laws do not provide for it.

After six months of service, employes gain the additional benefits of a year-end bonus plan, armed forces bonus, vacation policy, salary review and additional sick leave benefits, as well as termination pay in event of lay-off or severance.

One year of employment earns additional Hospital Service Insurance plus increased seniority rights under the program. Two years of service entitles the employe to membership in a Group Life Insurance program, at no cost to the employe.

A retirement Income Plan goes into effect after three years, and in the fifth year of service the employe begins to share in the ownership of the Company through a stock bonus plan, still at no cost to the employe. The amount of stock awarded to employes increases with years of service.

With each additional five years of service, special cash bonus awards ranging up to $500 are given in recognition of service.

Mr. H. Alvin Smith, president of the Company and initiator of the program, stated that "it is only appropriate that we find a realistic and practical way to show our recognition of the importance of the employe to the success of our business enterprise."

"In the final analysis, whatever a manufacturing company offers can be summed up in the two words, Quality and Service. There depend almost 100 percent upon the individuals in its employ.

"We hope to keep with us for a long time to come the fine people now on our team, and whenever openings occur, to attract the finest personnel in our industry to join us."

A 36-page booklet describing the program in full may be obtained by writing to the Executive Officers of the Company at 1 Park Avenue, N. Y.

Tracy to Manage Powell Pilot Plants

Dr. Ralph L. Tracy, formerly of the Research Staff of the California Institute of Technology and Captain, Chemical Warfare Service, has been appointed to manage pilot plant operations for John Powell & Co., Inc., suppliers of insecticide materials.

Prior to joining Powell, Dr. Tracy was Vice-President and Technical Director of Organic Chemicals Corp., Maryland, and subsequently Chemical Engineer in charge of the benzene hexachloride and tetra-ethyl-pyrophosphate plants of the Miller Chemical Corp., West Virginia.

Dr. Tracy's present work is in connection with the new Port Jefferson Research and Development Laboratory recently opened by John Powell & Co., Inc. Mr. H. Alvin Smith, president, stated that the process and product development work which Dr. Tracy will direct is an integral part of Powell's plans for providing top-quality materials and services to independent insecticide formulators.

Stauffer Names Wiggins In Florida

Stauffer Chemical Company's Florida division has announced the appointment of Harvey M. Wiggins, of Fort Meade, to head up the insecticide firm's activities in the Ridge Section.

W. L. Traylor, Stauffer's Southeastern District sales manager, said that Wiggins would be in charge of the office and warehouse at Winter Haven.

Pennsalt Issues Lindane And DDT Bulletin

A new service bulletin on how to use lindane and DDT in commercial pest control work has just been issued by the Pennsylvania Salt Manufacturing Company.

The bulletin gives in tabulated form complete instructions for mixing various quantities of finished solutions of 0.5% lindane or 5% DDT. Both insecticides control common household pests such as flies, mosquitoes, fleas, ants, cloths moths, etc., though lindane through its three-way action of contact, fumigation and stomach poisoning is recommended for control of roaches, silverfish and spiders as well. DDT is the "old reliable" of pest control work because of its versatility, and full instructions for mixing it for various uses are given in the bulletin.

A copy of the bulletin may be obtained by writing Agricultural Chemicals Department, Pennsalt Chemicals, 1000 Widener Building, Philadelphia 7, Pa.

Cal-Spray Builds Dust Plant

California Spray-Chemical is completing construction of an insecticide dust plant and branch office at Santa Maria, Cal. The plant, to have a maximum capacity of 80,000-90,000 lb per day, is designed to formulate such products as lindane, DDT, DDD, toxaphene, parathion and tetraethyl pyrophosphate.

GENERAL REPORT TO CONTRIBUTORS

Radioactive Research

COMMITTEE

F. E. Boyd, F. O. Case, J. A. Chucka, F. W. Darner, D. S. Fink, H. E. Hendricks, R. R. Hull, D. D. Long, H. B. Siems, J. E. Totman.

V. Sauchelli, Chairman

Your Committee has been active since September 1946 collecting funds and cooperating with federal and state research agencies. These activities were confined to the initiation and support of research projects designed to utilize the radioactive tracer technique in the solution of agronomic problems involving nutrient phosphorus. The data reported from cooperative work in 1947 and 1948 were published in the form of symposia in Proceedings of Soil Science Society 12: 1948, and Soil Science 68 (2): 113, August 1949, respectively.

On March 20th I attended a meeting at Beltsville, Maryland, at which were present Messrs. F. W. Parker, K. D. Jacob, and L. A. Dean, of the Bureau of Plant Industry, Soils & Engineering, and Russell Coleman, N.F.A. Dr. J. R. Taylor of the Plant Food Council was unable to attend. The discussions brought out clearly that the Fertilizer Industry's contributions to these cooperative soil and fertilizer investigations have been and are decidedly essential. The first contribution in 1946 initiated a program that has subsequently grown and expanded to all regions of the country. Although relatively small at present, the Industry's contribution, according to Dr. Parker, continues to catalyze the entire program. For example, the estimated expenditures by various agencies for this cooperative work in 1951 amount to $235,000 of which the Industry contribution is $16,000. However, our funds are used in such a vital way that without that money the program would seriously suffer. These observations are made here to emphasize to you the gratitude, freely acknowledged, of the four regional soil research committees for the Fertilizer Industry's sustained contributions. We can all justly feel proud of the part we have played in bringing this important cooperative research with radioactive elements into being and in helping it to move along to important results.

Attached is a summary of field experiments for 1951, together with a detailed statement of the projects in each region which we are supporting for the period 1950-51. Within a few days I will send you a summary of the results of all field experiments with radiophosphorus that were conducted in 1950.

It may interest you to know how contributions have come in, year by year. The Fertilizer Industry contributed $12,450 to the first appeal in 1946. Subsequently, the amounts contributed were: in 1947, $20,100; in 1948, $22,800; and in 1950, $15,300. A detailed list of the contributors with the amount each gave is appended. Also appended is a chart showing the disbursements and the balance on hand.

SUMMARY OF 1951 FIELD TESTS

Location and number: 29 states and Canada. 114 field experiments.

Crops: 23 crops.

Types of objectives: Comparison of fertilizer materials. Granulation of fertilizers. Time and method of fertilizer application. Surface applications to sod crops. Foliar sprays. Effect of lime on phosphorus availability. Effect of N and K on phosphorus availability. Effect of irrigation on phosphorus availablity. Root

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extension studies. Comparison of crops. Residual phosphorus in rotation and permanent fertility experiments. Soil phosphorus availability.

In addition: The cooperative program also includes a series of uniform experiments designed to provide material to aid in developing methods for diagnosis of the phosphorus fertility status of soils.

Regional basis: The cooperative plans arranged by regions include: Northeastern Region: 4 periments with oats. (9 states wheat. (2 states participating.)

North Central Region: 21 experiments wih oats. (9 states participating.)

Southern Region: 16 experiments with cotton, and 3 with oats. (7 states participating.)

Western Region: 24 experiments with spring wheat. (6 states and Canada participating.)

The Bureau of Plant Industry, Soils and Agricultural Engineering will prepare and supply a total of 270 pounds of P_2O_5 containing 24.5 curies p32 for all the cooperative experiments.

States cooperating: Alabama, Arizona, California, Colorado, Georgia, Florida, Idaho, Illinois, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New York, North Carolina, North Dakota, Oregon, South Carolina, South Dakota, Texas, Utah, Virginia, Washington, Wisconsin. Canada, University of Saskatchewan.

INDUSTRY-SUPPORTED PROJECTS

1521-52 Northeastern Region

New Hampshire Agricultural Experiment Station $2,000

A comparison of the relative absorption of phosphorus by apple trees and fruits from foliar sprays, and from soil applications of fertilizer, using radioactive phosphorus as a tracer.

Objectives:

1. To determine whether apple trees can absorb phosphorus applied to their leaves in foliar sprays.

2. To determine which of several salts of phosphorus is absorbed most readily by apple leaves.

3. To determine the comparative rates of absorption of phosphorus from foliar sprays and soil applied phosphates.

4. To determine the effect on apples resulting from applications of phosphorus as a foliar spray with that as a salt applied directly to soil around the trees.

Maine Agricultural Experiment Station $2,000

Factors affecting the use of fertilizer and soil phosphorus by oats, potatoes, and blueberries.

Objectives:

1. To determine the effect of granulation on the use of phosphorus by potatoes.

2. To study the relationship of phosphorus use by oats and clover from soils having different levels of available phosphorus and soil test values.

3. To determine to what extent phosphate fertilizer is used by native blueberry plants.

Southern Region

Virginia Agricultural Experiment Station $3,000

Utilization of fertilizer phosphorus applied as a top dressing on permanent pastures and meadows.

Objectives:

1. To measure the influence of granulation and placement of superphosphate on established stands of ladino clover-orchard grass and bluegrass white clover mixtures.

2. To measure the influence of rates of superphosphate fertilization for establishing ladino clover-orchard grass mixtures on maintenance requirements of P_2O_5.

3. To measure the relative suitability of winter and spring applications of superphosphate.

North Carolina Agricultural Experiment Station $1,500

Utilization of calcium, by crops, from the calcium phosphate, sulfate, and carbonate contained in mixed fertilizer.

Objectives:

1. To establish the fraction of plant calcium originating from each of the three sources of calcium (monocalcium phosphate, gypsum, and calcium carbonate) in a typical tobacco fertilizer.

2. To estimate the fertilizer contribution to the tobacco plant's calcium at each of several stages of growth and to determine the distribution of the fertilizer calcium within the plant.

3. To compare the utilization of calcium and phosphorus from monocalcium phosphate.

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4. To evaluate the hazards of field application of radiocalcium by tracing the movement of the labeled compounds horizontally and vertically in the soil, and by recovery of Ca^{45} in crops grown after the tobacco crop.

5. To determine the possibility of reducing the hazards of field use of radiocalcium by swamping out the Ca^{45} through heavy applications of $CaCO_3$ or $CaSO_4$.

North Central Region

Michigan Agricultural Experiment Station $3,500

A study of the utilization of phosphorus from granulated and non-granulated phosphatic fertilizers by several crops grown on some Michigan soils.

Western Region

Utah Agricultural Experiment Station $3,500

The influence of moisture on the availability and utilization of phosphorus.

Objectives: To determine how different soil moisture conditions influence the absorption of phosphorus by plants.

Travel Funds to Enable State Representatives to Attend the Annual Phosphorus Work Conference

Mississippi Agricultural Experiment Station $500

Indiana Agricultural Experiment Station $500

Colorado Agricultural Experiment Station $500

Georgia Agricultural Experiment Station $500

In support of equipment development for the use of radioactive fertilizers.

Netherlands Ag Attache Moves to Embassy

The office of the agricultural attache of the Netherlands Embassy in Washington, D. C., has been moved to the Chancery of the Embassy, 1470 Euclid St., N.W. Attaches are: R. L. Beukenkamp and H. J. Van Kretchmar. J. P. Tripplaar is assistant.

NAC

(Continued from page 38)

weed control uses for many other chemicals such as 2,4, 5-T, IPC, TCA, ammonium sulvamate, cyanamid, chlorates, arsenicals, boron compounds, dinitro compounds, herbicidal oils, and others. The current trend in weed control research is to concentrate study on specific crops and under specific problem conditions. Studies were reported under way on almost every crop grown in American agriculture. One of the most significant current developments is centered around the use of chemicals as pre-emergence sprays that kill weed seedlings during the process of germination. Promising results

from pre-emergence treatments were reported with sugar beets, cotton, peanuts, soybeans, potatoes, corn under certain conditions, asparagus, gladioli, and other field and horitcultural crops.

The use of TCA as a pre-emergence weed control measure in Midwestern sugar beet fields is expected to eliminate the need for many laborers for hand weeding this year. Some cotton growers are using a combination of pre-emergence applications of dinitro compounds and post-emergence sprays of herbicidal oils as a means of off-setting the shortage of labor for hand hoeing in cotton fields.

The discovery that an array of complex organic materials such as dithio carbamates, phenyl mercury compounds, dichloro naphthoquinone, gloxyalidines, dinitro compounds, and pthalimide derivatives are effective fungicides was cited as the most important advance with chemicals for controlling fungus diseases of plants. These materials represent the end-product of a decade of close teamwork between the chemical industry and plant pathologist. More than 10 million pounds of organic fungicides were devoted to agricultural uses in 1950. Generally they are more specific in their action than the older fungicides, and they often give more effective disease control. Their use reduces demand for such strategic materials as copper and sulfur.

Organic compounds have solved most of the problems of fruit and vegetable damage from copper fungicides, and promise solution to fruit damage from sulfur under many conditions. The use of dithio carbamate compounds has increased Anjou pear production by 300,000 boxes yearly. The recent discovery of less expensive soil fumigents, such as dichloropropene and enhylene dibromide, is now making nematode and wireworm control possible under field conditions. Their use is limited to such high valued crops as tobacco, sugar beets, vegetables, because soil treatment costs $35 to $40 per acre. Experimental evidence indicates that soil fumigation would now be profitable on about three million acres of U. S. Cropland.

New uses for chemicals in preserving crops and for improving crop quality were also reported. In 1950, about 20,000 acres of apple orchards in the Pacific Northwest were thinned with spray applications of dinitro at blossom time. Experimental studies show that chemical apple thinning gives a 25% increase in yield for only a fraction of the cost of hand thinning.

Several different chemicals have been found to be effective in getting leaves to drop from cotton plants before picking time. Defoliation helps to prevent boll rots, retards deterioration of fiber and seed, expedites hand picking, and increases the efficiency of mechanical picking. In 1950, defoliating chemicals were applied to more than 1½ million acres of cotton. . . The Research chief described many additional promising new uses for chemicals. Preliminary investigations with rice indicate that pre-harvest chemical sprays may be effective in lowering the moisture content of rice—thus improving crop quality and conditioning the rice for storage while it is standing in the field. Full test of Dr. Salter's address available from Press Service, Office of Information, U. S. Dept. of Agriculture, Washington 25, D. C.

Dr. A. F. Camp, Vice-Director in Charge, Citrus Experiment

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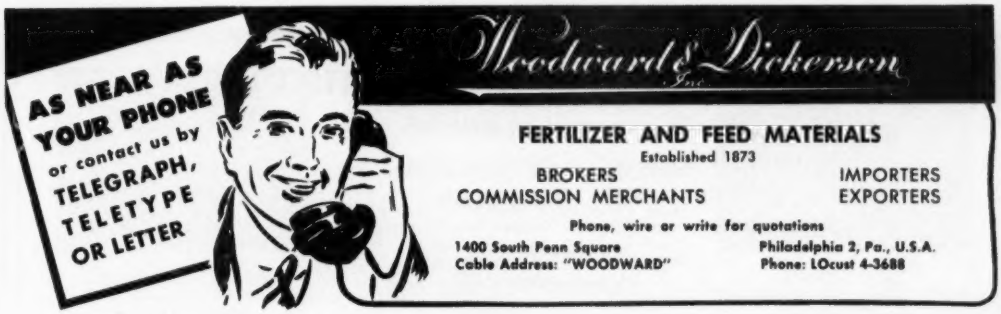
"37 Years Service to the Fertilizer Industry in the Southeast"

Station, Lake Alfred, Fla.:—Extensive use of nutritional sprays, fungicide and insecticides make spraying of citrus a complicated procedure. In the early thirties it became apparent that a coordinated system of presentation to the grower would be a necessity if extensive difficulties were to be avoided. The Florida Citrus Commission and an Advisory Committee of technical men from various agencies tried a presentation of a coordinated spray and dust program on which all groups would agree. This program now published yearly in January, has given Florida's citrus industry one of the best organized programs in existence.

Willard M. Fifield, Director, Florida Agricultural Experiment Station, Gainesville, Fla.: —Mr. Fifield, guest speaker at the luncheon, found an interested audience to hear his talk on the work of Florida's Agricultural Experiment Station and its great value to the state's many industries which depend upon its crops and agriculture. Florida's agriculture has unique problems, said Mr. Fifield. In many cases its farming methods, and crops are different from those of states to the north. Market centers are a long distance away. The climate which beneficial in many respects is attractive to insects, disease and parasites not so prevalent in states with less rainfall and colder winters. The soils for the most part are not fertile in their natural state. In spite of the handicaps, Florida's agriculture has experienced almost phenominal growth. To illustrate: In 1935 cash income to Florida farmers and cattlemen was something like $120,000,000—last year it was approximately $450,000,000. As recently as 1930 Florida produced only 7,000,000 boxes of oranges—by 1949, production of oranges alone, not counting grapefruit or other citrus, had increased to 58,000,000 boxes. Sugarcane for sugar in 1930 amounted to 27,000 tons but by 1949 it was 1,124,000 tons. Celery in 1932 amounted to 1,743,000 crates—in 1949, 1,124,000 crates. Irish potatoes in 1931 produced 1,505,000 bushels, in 1949, 5,370,000 bushels. In 1930 there were 590,000 head of cattle on Florida farms and ranches; by 1949 this number had increased to 1,392,000 head. Research unquestionably has played a substantial role in this growth, and the responsibility of the Station staff is a considerable one.

Highlights of the Station's accomplishments over the years were enumerated and the list long. In the field of citrus, Florida's largest industry, an outstanding contribution was the determination of nutrition needs, above ordinary fertilizer elements, which revolutionized citrus grove management and resulted in exceptional thrift of trees, better fruit color and quality, much greater yields, overcame alternate year bearing of seedy grapefruit, and increased cold resistance of trees. The work of Dr. A. F. Camp and his co-workers at the Citrus Station has been a tremendous factor in assisting the rise of Florida to its present status as the world's largest citrus producing area. Research in soil chemistry and agronomy has furnished basic information for the tremendous increase in improved pastures all over the state.

Business sessions for the last day presented several speakers from Washington, the first being W. R. Allstetter, Deputy Director, Office of Materials and



Facilities, PMA, USDA: — Mr. Allstetter outlined the methods used in making a survey to determine the usage of chemicals for agriculture. With the acreage information available, the survey called for assessing the farmers plans and converting the acreage figures into a trend of demand. The survey proved remarkably accurate.

Dr. Herbert L. J. Haller, USDA:—Dr. Haller stressed the necessity of care in formulating and testing pesticides—complimented the manufacturers in the industry on their cooperation.

Mr. L. N. Markwood, Chemical Division, National Production Authority:—Mr. Markwood told how DDT and other chemicals can be used as an instrument for building international friendships. Typhus and malaria have been the scourge of many under-privileged areas for centuries; the government intends to see that minimum requirements of friendly countries for DDT are met. The United States has ¾ of the world's DDT-producing capacity and no other country can answer these needs. He predicted that this first year of emergency may be the worst, many of the chemicals shortage problems will be alleviated by the end of 1951.

Cedric Gran, Chief, Agricultural and Chemical Fertilizers Section, ESA:— Mr. Gran told what his group had accomplished in Washington; recommended that an industry advisory committee from a price standpoint be appointed.

At conclusion of Mr. Gran's remarks, Lea S. Hitchner, Executive Secretary NAC Association addressed the membership briefly before adjourning.

BULLETIN

Lee Ashcraft, Board Chairman of Ashcraft-Wilkinson Co., Atlanta, was hospitalized April 26. For a time the attending physician despaired of his life, but as we go to press his associates felt much encouraged. Pneumonia, which had to be fought first, had been cleared up, and Mr. Ashcraft was considered well enough to undergo fluoroscope tests of the abdominal condition which sent him to hospital.

He is at Emory University Hospital, Emory, Georgia. Cards and letters may be sent there or to the Company offices, but no visitors are permitted at this time.

Mr. Ashcraft is beloved throughout the industry, of which he has been a part since 1904. He was 80 years old at his last birthday, and has been active in business and civic affairs with energy and enthusiasm that belies his years.

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FREQUENT ON-FARM CALIBRATION OF SPRAY MACHINERY NEEDED

Frequent checking or calibration of spray equipment by the operator on the farm offers the only accurate and practical way of applying correct amounts of herbicides to weeds, according to research by engineers of the U. S. Department of Agriculture. The investigations have shown that wear on the many parts of the sprayer, the speed at which spraying is done, and the care taken in mixing the herbicides with water, all cause variations in spraying rates that can seriously affect spraying results.

Two ways of calibration suggested by the engineers are: (1) Select the gallonage of mixed spray that is required per acre, and then, by trial and error, adjust the tractor speed and pump pressure to get this dispersal; (2) select a convenient tractor speed and pump pressure and then see how much spray is applied per acre. With this knowledge, mix chemicals and water to get the strength spray required.

One of two things generally happens if farmers follow the spray rate tables furnished them with their sprayer, rather than calibrating their machines before starting to work. In the first case, they put on too much spray, which not only wastes herbicides, but, if they are spraying weeds growing among sensitive crops, may also kill both weeds and crop.

The second possibility, according to the engineers of the Bureau of Plant Industry, Soils, and Agricultural Engineering is that too little spray is applied, resulting in poor weed control, which means wasted weed killer, time, and money in operation of the spray equipment.

Manufacturers' recommended spray rates, accurately arrived at in tests with laboratory equipment, may not apply so completely when the farmer hooks the sprayer on behind his tractor and moves into the field. Tractor speed is one of the important factors in correct application. Unless the tractor is equipped with a speed indicator, it is hard to do more than approximate the rate of speed. Errors are, thus, introduced that only calibration by the farmer will correct. The tractor power take-off speed, which in many instances drives the sprayer pump, can vary as the engine revolutions per minute fluctuate, changing the sprayer pressure—another important spray-rate factor.

As parts become worn, the pump of the sprayer will continue to supply spray but at fluctuating pressures. These variations in pressure, developed by a worn or dirty pump, can change the amount of spray put out from day to day, or in severe cases, from hour to hour.

Strainers and nozzle screens of the sprayer often become partially clogged, reducing the amount of spray that can pass through. The nozzles, themselves, although carefully machined by the manufacturer to supply certain quantities of spray at certain pressures, offer another source of variation as they wear or become plugged. The rough treatment that the sprayer pressure gage gets in field operation can also damage it so that it reads inaccurately.

Mixing the chemicals has not been too much of a problem

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12,825 Gallons

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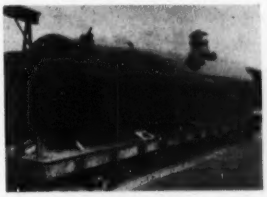

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thus far, the engineers say, because with most herbicides, relatively small amounts of the chemical weed killer are mixed with large volumes of water. Errors are, therefore, generally within a range of two or three percent. However, with low gallonage sprays and sprayers making their appearance, it will mean less water for the same amount of chemical, and as a result greatly increase the chance for error.

Even though the sprayer is calibrated, the causes of variation are still present. To do a good, safe job of spraying, it is necessary to continually check the operation and rate of application of the sprayer.

BATTELLE REPORT ON COPPER TESTS

The vital need for copper in the soil to produce maximum crop yield is not generally well known. This is particularly true for soils where borderline copper deficiencies exist, according to Dr. Frank A. Gilbert, agricultural scientist at Battelle Institute, Columbus, Ohio.

A copper deficiency severe enough to cause disease symptoms insures remedial measures, but if less severe, usually attracts little attention, Dr. Gilbert explains. Result is that maximum growth is not obtained with many crops for lack of a small amount of copper which could be supplied at slight cost per acre.

Greenhouse and field plot tests have shown that the first slight indication of need for the element is demonstrated by a retardation of growth which occurs long before any visible symptoms are apparent. Since areas of marginal deficiency will outnumber areas of acute deficiency, it is difficult to estimate the amount of potential yield actually lost.

Even where the copper content of a soil has appeared to be ample, there are many instances where applications of copper have resulted in marked crop increases. More than two hundred field tests, primarily on tobacco, have been conducted by Dr. Gilbert and his associates over a period of eight years. Results show that eighty per cent of those plots which had a "normal" copper content, and which were additionally treated with copper, produced a higher quality leaf and an average eight per cent yield increase.

The only similar set of experiments with copper sulphate, conducted (in Denmark) primarily on cereals, came up with comparable results. Over a period of nineteen years, 640 trials were made, of which eighty-seven per cent resulted in greater yields.

Opposition to the inclusion of copper in general fertilizer mixtures has been voiced on grounds of its cost and possible toxicity over a period of years. Many experiments have been carried on which generally disprove the latter belief. In one, still being conducted by Dr. Gilbert on Miami soil, twenty pounds of copper sulphate per year per acre have been added since 1946. The treated vegetable plots thus far have slightly outyielded the untreated plots and there is no evidence of toxicity.

In another, a greenhouse experiment, tomato plants were set in pots of Miami soil mixed with sand to which was added copper sulphate sufficient to injure, and eventually kill, the young seedlings. After two

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weeks, other seedlings, planted in the pots from which the dead plants had been removed, grew and eventually bore fruit.

As a result of these and many other experiments, the Battelle scientist believes there is little possibility that copper toxicity would ever occur on ordinary agricultural soils by accrued copper from fortified fertilizer. This would be so even if the fertilizer contained as much as one per cent copper.

More widespread knowledge of the non-poisonous effects of copper as a fertilizer amendment will result in its greater use for greater crop yield, Dr. Gilbert believes. His preliminary survey of eastern fertilizer companies indicates that use of copper for more adequate soil nutrition has been increasing during the past ten years. The same survey also shows that most independent farmers, as yet, give little thought to the possible need for any minor elements or do not consider that their insurance value is sufficient to warrant the added cost.

The study of the effect of copper on plant nutrition has been in progress at Battelle since 1943. Dr. Gilbert, who heads the research, is author of the book, "Mineral Nutrition of Plants and Animals."

APFC

(Continued from page 41)

Credentials—J. C. Crissey, President, G.L.F. Soil Building Service, Ithaca, New York, Chairman; John R. Riley, Jr., Vice President, Spencer Chemical Company, Kansas City, Mo.; W. B. Hicks, President, Wilson & Toomer Fertilizer Company Jacksonville, Florida.

Golf—Dean R. Gidney, United States Potash Company, New York, Chairman; C. F. Burroughs, Jr., President, F. S. Royster Guano Company, Norfolk, Va.; R. B. Lenhart, G.L.F. Soil Building Service, Ithaca, New York; W. F. McLane, Lyons Fertilizer Company, Tampa, Florida and John A. Roberts, Pioneer Phosphate Co., Des Moines, Iowa.

Tennis—Alfred J. Dickinson, Virginia-Carolina Chemical Corp., Richmond, Va., Chairman; Benjamin H. Brewster, Jr., Baugh & Sons, Baltimore, Md., and William J. Rabel, American Cyanamid Co., New York, N. Y.

Hospitality—Fred J. Woods, President, The Gulf Fertilizer Company, Tampa, Fla., Chairman; John Hall, Potash Company of America, Washington, D. C.; R. F. Boynton, United States Potash Company, Atlanta, Ga.; Roy F. Camp, Chilean Nitrate Sales Corp., New York City; W. B. Copeland, Smith-Douglass Company, Inc., Norfolk, Va.; J. D. Stewart, Jr., Federal Chemical Company, Inc., Louisville, Ky.; G. Tracy Cunningham, Armour Fertilizer Works, Atlanta, Ga.; Dr. S. F. Thornton, F. S. Royster Guano Company, Norfolk, Va. and E. M. Kitchen, Pacific Coast Borax Company, Beaver Dam, Wisc.

Ladies—Mrs. J. D. Stewart, Jr., Louisville, Kentucky, Chairman; Mrs. Horace M. Albright, New York City; Mrs. Harry B. Caldwell, Greensboro, N. C.; Mrs. L. Dudley George II, Richmond, Virginia; Mrs. John E. Sanford, Atlanta, Georgia and Mrs. G. A. Woods, Raleigh, N. C.

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Schutte and Koerting Company, Manufacturing Engineers, on the occasion of their 75th anniversary, announce the consolidation of General Offices and Manufacturing facilities in one location in an enlarged modern plant at Cornwells Heights, Bucks County, Penna.

Periodical on Dust And Fume Control

The first issue of "Industrial Ventilation", a new periodical devoted to the latest developments in industrial dust and fume control, has just been published by American Wheelabrator & Equipment Corporation, Mishawaka, Indiana.

Future editions will present dust and fume control data and information applying to all segments of the chemical and metallurgical industries.

Copies of this publication will be mailed upon request. Write to the American Wheelabrator & Equipment Corp., 555 South Byrkit St., Mishawaka, Indiana.

FERTILIZER TAX TAG SALES AND REPORTED SHIPMENTS[1]
(In Equivalent Short Tons)
Compiled by The National Fertilizer Association

STATE	March		January-February		July-February	
	1951	1950	1951	1950	1950-51	1949-50
N. Carolina	1/	1/	615,108	608,423	1,006,393	865,994
S. Carolina	179,846	190,018	348,129	356,610	656,340	556,754
Georgia	284,021	332,172	438,762	358,026	718,215	575,239
Florida	94,454	85,158	279,480	261,351	806,700	729,980
Alabama	167,476	196,178	218,667	152,100	445,681	317,617
Tennessee	56,190	100,283	77,901	42,979	197,419	144,022
Arkansas	53,360	98,191	82,176	41,554	158,109	108 982
Louisiana	65,371	117,217	83,626	56,589	157,853	113,033
Texas	101,512	201,961	113,890	108,242	369,999	323,891
Oklahoma	1/	1/	27,911	29,834	83.519	84.352
TOTAL SOUTH	1,002,230	1,321,178	2,285,650	2,015.718	4,600.228	3.819 864
Indiana	70,930	124,727	204,275	172,197	700,439	577,616
Kentucky	76,571	99,928	155,417	154,376	363,180	320,423
Missouri	124,779	84,869	191,397	133 866	454,577	301 850
TOTAL MIDWEST	272.280	309,524	551,089	460,439	1,518.196	1,199.889
GRAND TOTAL	1,274,510	1,630,702	2.836,739	2.476,157	6.118.424	5 019 753

1/ Oklahoma and North Carolina report tax tag sales 30 days after the end of the current month. Oklahoma and North Carolina tag sales for February 1951 represent 15,494 and 277,460 tons respectively, compared to 21,172 and 320,371 tons during February 1950.

U. S. SUPERPHOSPHATE SUMMARIES, in Thousands of Short Tons
Based on Data for 198 Plants, Representing Total U. S. Production
Compiled from Reports Submitted to The National Fertilizer Association
and A Summary of Reports Submitted to the Bureau of the Census

	February, 1951								
	Normal 18% APA Basis	Wet Base 18% APA Basis	Conc. 45% APA Basis	Total, 18% APA Basis				Conc. (45% APA)	
				February		Jan.-Feb.		Jan.-Feb.	
				1951	1950	1951	1950	1951	1950
Stocks, first of period	1,025	19.3	60	1,194	1,496	1,207	1,421	55	104
Production	812	5.3	59	964	857	1,950	1,660	121	111
Received from other plants	15	0.0	0	15	11	26	23	0	0
Book adjustments	0	0.1	0	1	9	6	12	1	0
Total supply	1,852	24.7	119	2,174	2,373	3,189	3,116	177	215
Shipments	435	7.0	56	581	627	1,156	1,088	113	118
Used in reporting plants	466	.9	1	470	434	910	716	2	3
Total disposit'n	901	7.9	57	1,051	1.061	2,066	1.804	115	121
Stocks, end of period	951	16.8	62	1,123	1,312	1,123		62	94

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EXPORT ORDERS SOLICITED

MARKETS

ORGANICS: Fertilizer Organics continue in firm market position with relatively few offerings at the present time. Domestic Nitrogenous Tankage ranges from $4.60 to $6.00 per unit of Ammonia in bulk, FOB shipping point. Last sales of Imported Nitrongenous Tankage were at $6.25 per unit of Ammonia in bags, CIF Atlantic port for Summer and Fall shipment. South American Organics, except for Bone Meals, are at prices too high to interest United States buyers.

CASTOR POMACE: This market is quiet with movement primarily against existing contracts which cover production through June. Price is nominally $5.50 per unit of Ammonia in bags, FOB North Eastern production points for material testing minimum 5.75% Ammonia.

DRIED GROUND BLOOD: Chicago market is relatively quiet at around $9.00 to $9.25 per unit of Ammonia, FOB that area. The New York market is nominal at $9.00.

POTASH: Demand continues heavy, fully absorbing Domestic production capacity. Movement is steady, hampered occasionally by car shortages.

GROUND COTTON BUR ASH: Some supplies are available and are being offered for prompt and April/May/June shipment with some producers material averaging very close to 40% K_2O Potash primarily in the form of Carbonate of Potash.

PHOSPHATE ROCK: Movement is primarily governed by the supplies of Sulphuric Acid, but recently shipments to Domestic consumers have been fairly steady.

SUPERPHOSPHATE: Triple Superphosphate continues in excessive demand which the supply cannot meet. Normal grade Superphosphate also is in strong demand and practically no surplus is available throughout the country.

SULPHATE OF AMMONIA: Coke-oven production is very tight in supply, with demand maintaining shipments directly from production. Movement is against existing contracts.

AMMONIUM NITRATE: Demand continues in excess of supply and price continues at ceiling levels. During the last few weeks some supplies of Calcium Ammonium Nitrate arrived at Southern ports to help relieve the short supply situation. This material tested 20.5% Nitrogen.

NITRATE OF SODA: It is reported the Domestic production has ceased and demand for Imported Nitrate of Soda is considerably in excess of available supply.

GENERAL: As the season, particularly in the Southeast, nears an end, very little surplus fertilizers are expected to remain in stock. Demand for all three major fertilizer ingredients, Nitrogen, Superphosphate and Potash, continues strong. Farmers are particularly anxious about supply of Nitrate of Soda for top-dressing purposes.

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WANTED: Experienced and qualified superintendent to take full charge of small independent fertilizer plant located in Mid-west. Production approximately 15000 tons per year. Need man qualified to formulate, purchase raw materials and direct production and sales. Will pay salary and share in profits plan. Good opportunity. Write giving full particulars as to qualifications, experience and references. All replies held in strict confidence. Will arrange interview at your convenience. Box 15, c/o Commercial Fertilizer, 75 Third St., N. W. Atlanta, Ga.

WANTED: Fertilizer Superintendent by old established Fertilizer Company in middle west, complete plant. Excellent opportunity for experienced man. Box # 4, c/o Commercial Fertilizer, 75 Third St., NW Atlanta, Ga.

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